MACHINERY

Design—Construction—Operation

Volume 46 MAY, 1940 Number 9

June MACHINERY will feature articles on an Unusual Phase of Trade Education and Training; the Selection of Materials to Best Suit Any Required Purpose; a New Type of Thread that has been Introduced in Airplane Engine Manufacture; a New Die Steel; Flame-hardening; and Unusual Features in Die Design

PRINCIPAL ARTICLES IN THIS NUMBER

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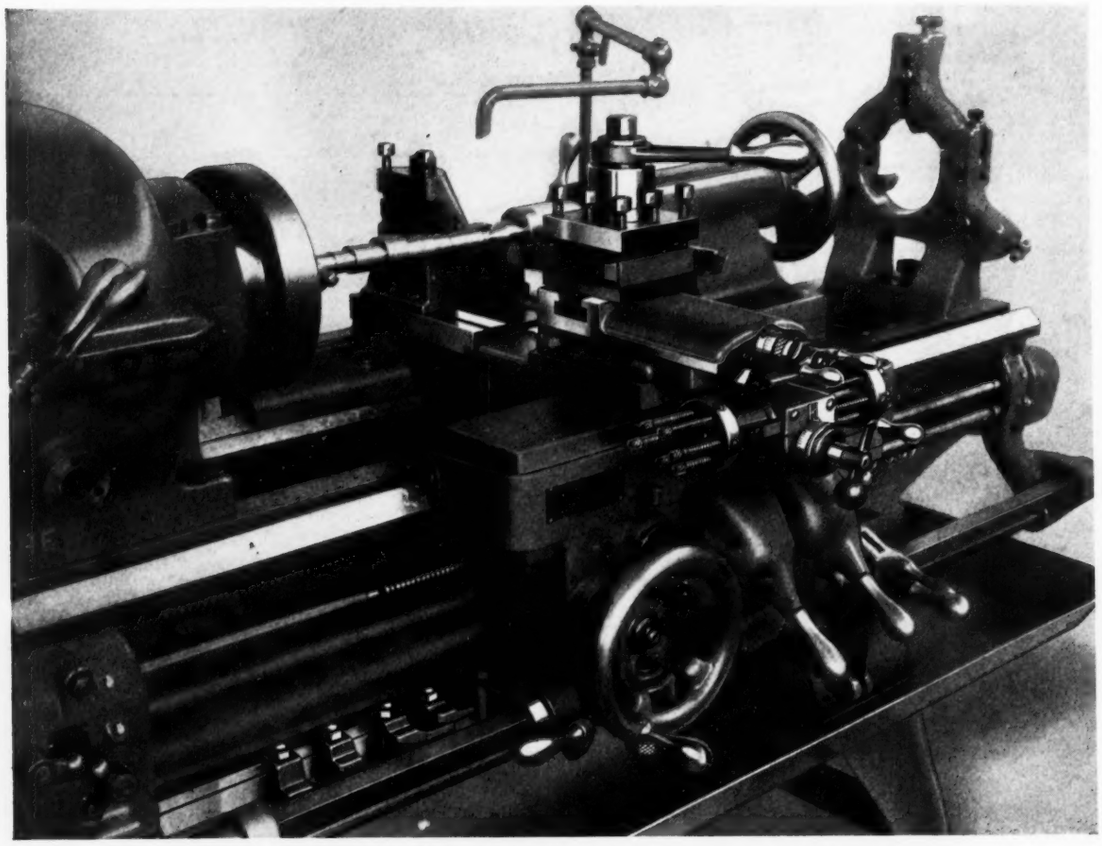
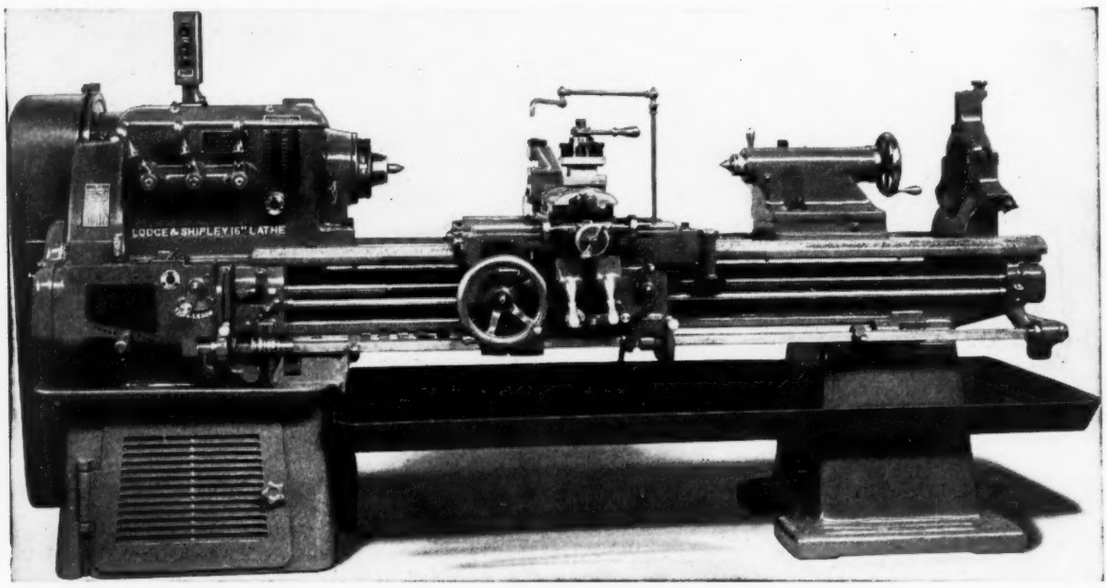


A Partial View of the Manufacturing Lathe Showing Its Attachments



16" Lodge & Shipley Selective Head Manufacturing Lathe

THE LODGE & SHIPLEY
CINCINNATI,

MACHINERY

Volume 46 NEW YORK, MAY, 1940 Number 9

Centrifugally Cast Gear Blanks Introduced by Ford

The Application of Centrifugal Casting to the Production of Gear Blanks Possessing the Required Physical Characteristics for Automobiles, Trucks, and Tractors

By CHARLES O. HERB

NOTEWORTHY metallurgical achievements have been accomplished by the Ford Motor Co., Dearborn, Mich., during recent years in the development of foundry practices that have made it possible to use steel castings for automobile parts previously made from steel forgings. The excellent results obtained from the use of cast crankshafts and camshafts in Ford, Mercury, and Lincoln-Zephyr automobiles led to the development of a method of casting blanks for certain gears used in tractors, automobiles, and trucks. This process is based on a centrifugal casting principle that insures gears of high physical properties and unusually good grain structure.

Centrifugal casting is now being applied in producing ring and transmission gears for trucks and tractors, as well as transmission-countershaft and differential ring gears for automobiles. These gears range in size up to 13 inches diameter. The centrifugal casting is done in a recently established foundry department, where a 15-ton electric melting furnace has been installed which delivers its molten charges to a 10-ton holding furnace. From the holding furnace, the molten metal is transferred by ladles suspended from monorails to the pouring stations of four large turntables equipped with steel dies or molds. A general view of one of these turntables, showing the pouring operation, may be seen in the heading illustration.

Eighteen molds are mounted around each turntable. The rims of the blanks on which gear teeth are later to be cut, are cast directly against the steel walls of the molds, which gives a refining effect. Each mold is made with a cope and a drag. As each mold approaches the pouring station, seen

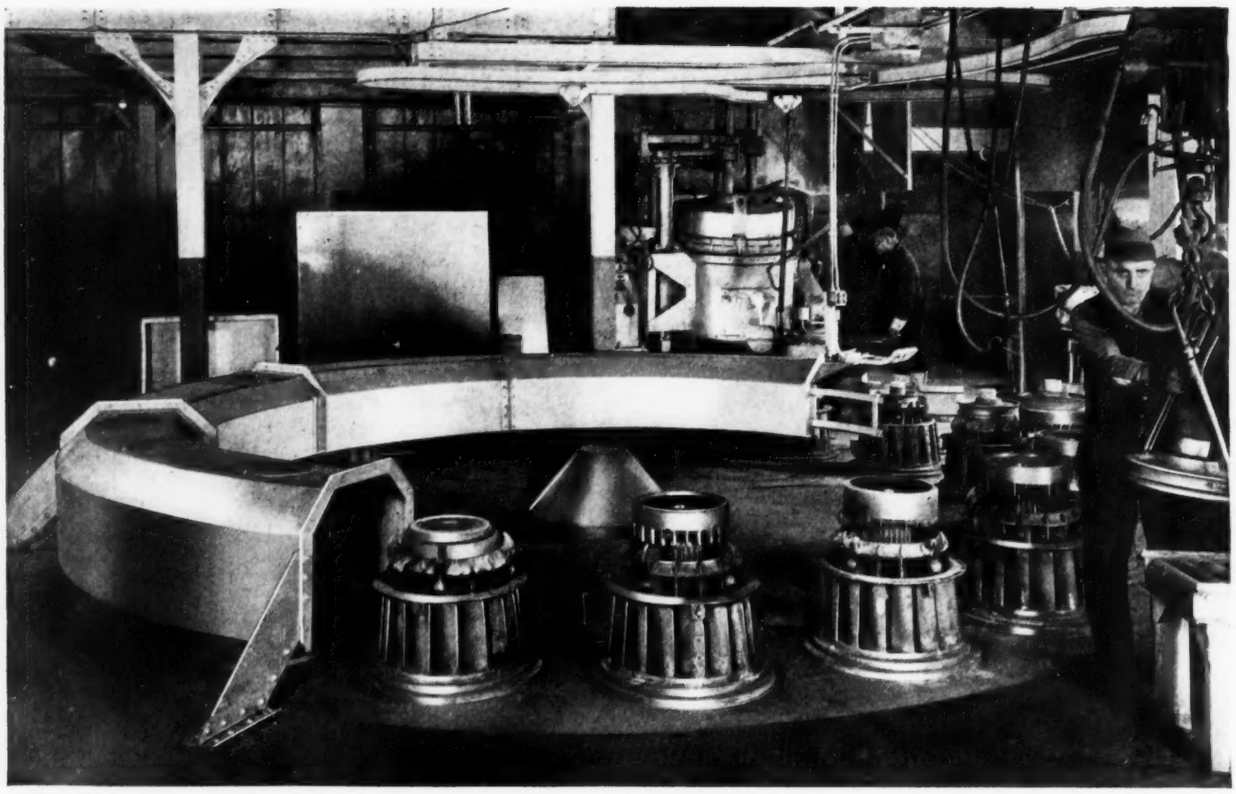


Fig. 1. One of Four Turntables Used in the Centrifugal Casting of Gear Blanks for Trucks, Tractors, and Passenger Automobiles

in the heading illustration, with the continued rotation of the turntable, a motor drive beneath the mold is automatically started to revolve it during pouring and cooling. The speed of rotation varies somewhat with the diameter of the gear, a speed of 350 R.P.M. being employed in the case of 7 1/2-inch diameter tractor gears. While the molds pass through the pouring and cooling stations, they are guarded on the sides and on top by sheet-metal covers.

The casting operation is simple enough, molten metal being poured into the spinning mold by tilting the ladle, as shown in the heading illustration. Close limits are maintained on the pouring temperature of the molten metal. This temperature is between 3850 and 2900 degrees F.

After spinning around for two minutes, the molds again reach the unloading station. Here the rotation of the mold is automatically stopped to enable the casting to be removed and new cores to be inserted. At the same time, a cam mechanism beneath the turntable causes three vertical rods to rise beneath the bottom plate of the mold, so that the casting and cores are lifted with respect to the outer mold walls, and the casting is thus stripped from the mold. The cam holds the mold in the raised position until new cores have been inserted, after which the mold drops back into the pouring position just before the mold drive is engaged again.

Each mold is driven by a 3-H.P. motor that runs at 1750 R.P.M. and is connected to the mold through gearing. The molds seen in the foreground in Fig. 2 are in the raised position, the operator being in the act of placing a cope on a mold that is ready to return to the pouring station.

Typical gears made by the centrifugal casting process are shown in Fig. 3, the blanks in the "as cast" condition being seen at the top of the illustration, and the gears with the teeth cut in the lower portion of the illustration. The construction of two typical molds is shown in Figs. 4 and 5. From the position of cores *A* and *B*, it will be seen that recesses and contours can be readily obtained on the sides or backs of gears for lightness or engineering design that would necessarily have to be machined on practically solid forged blanks. This feature of the centrifugal casting process provides substantial economies from the standpoint of scrap material and machining costs. Proper venting of the molds, which is done underneath, is of utmost importance in obtaining castings that are free of imperfections.

Each revolution of the turntable and, therefore, the casting of eighteen gears takes place in four minutes. This means a possible production of 270 gears an hour from each of the four turntables.

The use of steel molds enables dimensional limits on the gear blanks to be easily maintained. From 1/32 to 1/16 inch of stock is generally allowed for the machining of these blanks, whereas considerably more stock is usually required on

Fig. 2. Putting the Cope on One of the Centrifugal Gear Casting Molds, Ready for the Pouring Operation in the Station Seen in the Heading Illustration

forgings because of less dimensional accuracy and the fact that more draft is necessary on forging dies. Unusually smooth surfaces are obtained by the centrifugal casting process, so that no snagging operations are required. The hard sand cores used are given a silicon wash to close the pores and thus insure smooth sides on the gear blanks.

From the casting turntables, the gear blanks are placed on conveyors which carry them directly to an annealing furnace. After annealing, the blanks are shot-blasted, and then sent to the machining department. While the first gears from any melt are en route to the annealing furnace, a sample is dispatched to the metallurgical department for analysis. Within ten minutes, and before any gears go through the annealing operation, a report is received from that department.

Scrap from centrifugally cast gear blanks is extremely low. For example, the record of a day selected at random shows that out of a lot of 859 gears, only 5 were rejected because of foundry defects. Truck ring gears, which are later carburized, are made from a steel of the following analysis: Carbon, 0.18 to 0.25 per cent; copper, 0.50 to 1.50 per cent; silicon, 0.20 to 0.40 per cent; manganese, 0.40 to 0.60 per cent; molybdenum, 0.25 to 0.35 per cent; chromium, 0.10 per cent maximum; phosphorus, 0.05 per cent maximum; sulphur, 0.05 per cent maximum; and nickel, from 1.65 to 2 per cent. After carburization, these truck gears are direct-quenched or reheated and oil-quenched, and then drawn to a hardness of between 58 and 62 Rockwell C.

Transmission countershaft gears and differential ring gears for passenger cars are cast from a steel of the following analysis: Carbon, 0.30 to 0.38 per cent; copper, 0.50 to 1.50 per cent; silicon, 0.20 to 0.40 per cent; manganese, 0.55 to 0.75 per cent; molybdenum, 0.10 to 0.20 per cent; chromium, 0.80 to 1 per cent; phosphorus, 0.05 per cent maximum; and sulphur, 0.05 per cent maximum. These gears are normalized to from 170 to 196 Brinell, and, after machining, are hardened and tempered to about 477 Brinell.

Transmission gears for tractors and trucks are

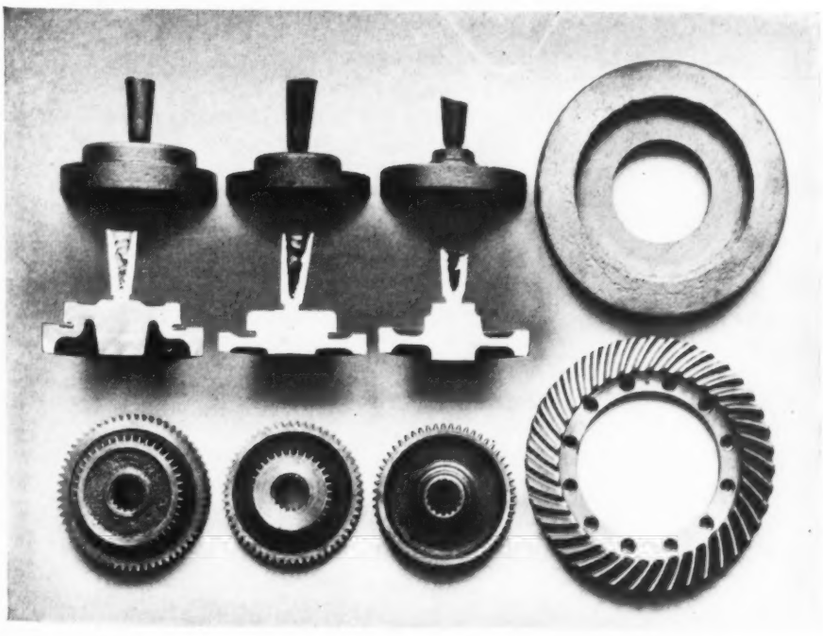


Fig. 3. Centrifugally Cast Gear Blanks before and after the Teeth have been Cut, the Pieces in Cross-section Showing Density of Structure

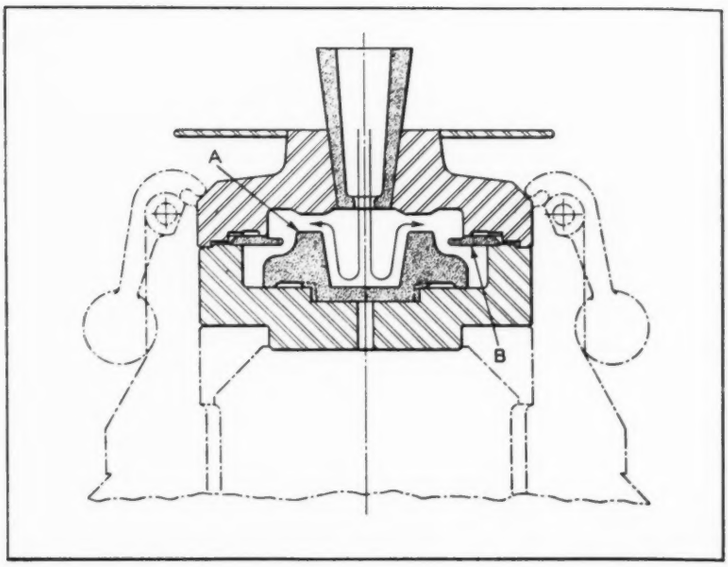


Fig. 4. Cross-sectional Drawing of a Typical Mold Used in Centrifugal Casting of Gears, which Shows Arrangement of Cores for Recesses in the Gear Blanks

cast from an analysis similar to that just given, except that the carbon content is between 0.38 and 0.45 per cent. These gears are normalized to the same Brinell reading as the passenger car gears, and, after machining, are hardened to a similar degree.

The physical properties of the passenger-car gears mentioned and the tractor and truck transmission gears, after being hardened by heating to 1500 degrees F. and quenched in oil, and then tempered by reheating to 355 degrees F., are as follows: Elastic limit, 212,000 pounds per square inch; tensile strength, 218,000 pounds per square inch; elongation in 2 inches, 0.75 per cent; reduction in area, 3 per cent; and Brinell hardness, 477.

The dies and molds used in the centrifugal casting process are made from three different steels. Steels with a low percentage of carbon and with both chromium and molybdenum, or with either chromium or molybdenum, have been found satisfactory for applications of this kind.

Westinghouse Machine Tool Forum

The principal feature of the Machine Tool Electrification Forum to be held May 6 to 8 at the plant of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will be a discussion of the new electrical features and applications now available for the solution of problems in machine tool design. Roger S. Pyne, chief engineer of the Van Norman Machine Tool Co., Springfield, Mass., will outline the application of electric drive and control for special-purpose grinding machines. D. K. Frost, electrical engineer of the Mattison Machine Works, Rockford, Ill., will speak on problems of control, wiring, and installation. D. L. Hadley, of the Westinghouse company, will demonstrate the principles of industrial design as applied to motor-control apparatus. Synchro-tie equipment—the "electrical lineshaft" for keeping functions of machines in step with one another—will constitute another subject of the meeting.

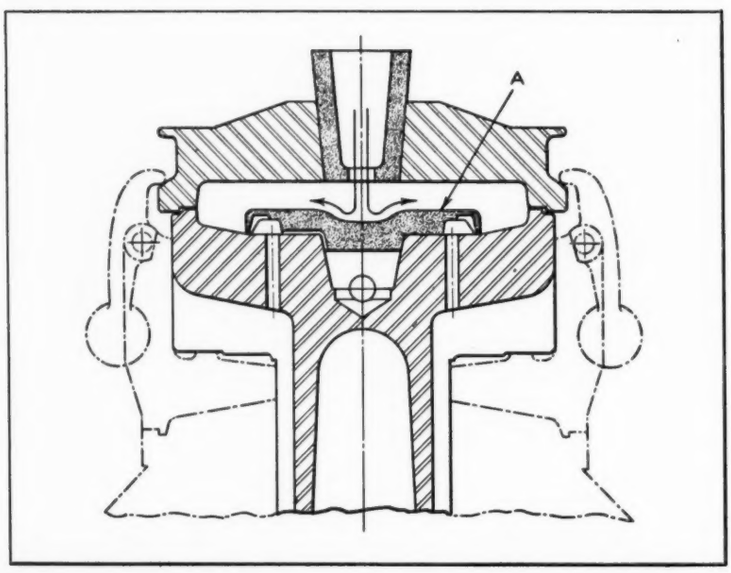


Fig. 5. Cross-sectional Drawing of a Mold Used in Centrifugally Casting Differential Ring Gears for Tractors

Broaching Spark Plugs to Improve Finish

Fig. 1. Broaching Fixture Used to Finish Six Surfaces of Hexagonal Portion of Spark-plug Shell in One Operation

THE main shells of spark plugs are usually formed from hexagonal stock, which is a good fit for regular spark-plug wrenches. After being finish-machined, the shells are given a cyanide treatment or protectively colored in some manner. When this is done, the relatively greater roughness of the unfinished faces of the hexagonal portion presents a poor appearance in comparison with the smooth machined surfaces.

To improve the appearance, a simple semi-automatic broaching process was developed by the Colonial Broach Co., Detroit, Mich., by means of which the six faces of the hexagonal portion of a spark-plug shell are broached in one operation, about 0.005 inch of stock being removed. A Colonial light-duty hydraulic broaching press, rated at from 1 to 2 tons capacity, is used for this operation. The fixture designed for the broaching operation is shown in Figs. 1 and 2. It handles all conventional sizes of spark plugs, ranging from 14 millimeters to 7/8 inch, with a single set of broaches. The spark-plug shell is dropped into the central opening on top of the fixture seen in Fig. 1. It is pushed down through the fixture by the press ram, which enters the counterbore and comes in contact with the internal seat of the shell. The broached piece drops out at the bottom of the fixture, after which the ram is returned automatically to its original position.

The fixture, as shown in Fig. 2, contains six simple slides, each of which is adjustable radially. To these slides are bolted flat broaches which, during the first half of the ram stroke, broach three of the six faces. The three remaining intermediate faces of the hexagonal work are then finished during the second half of the stroke. This arrangement permits the use of broaches of sufficient width to finish any size spark plug. Adjustment for different sizes is obtained by simply placing a locating plug in the top of the fixture, as shown at *A*, Fig. 2, and then sliding the broaches inward until the flat locating faces at the top of the slides make contact with the plug.

With a short 8-inch stroke, and with the ram traveling at the rate of thirty feet per minute downward and sixty feet per minute upward, the production rate is practically limited only by the rapidity with which the operator can drop shells into the fixture opening. Production rates of from 300 to 600 per hour are easily obtained. Since the cut taken is quite light, long broach life is assured, which means low unit cost per operation.

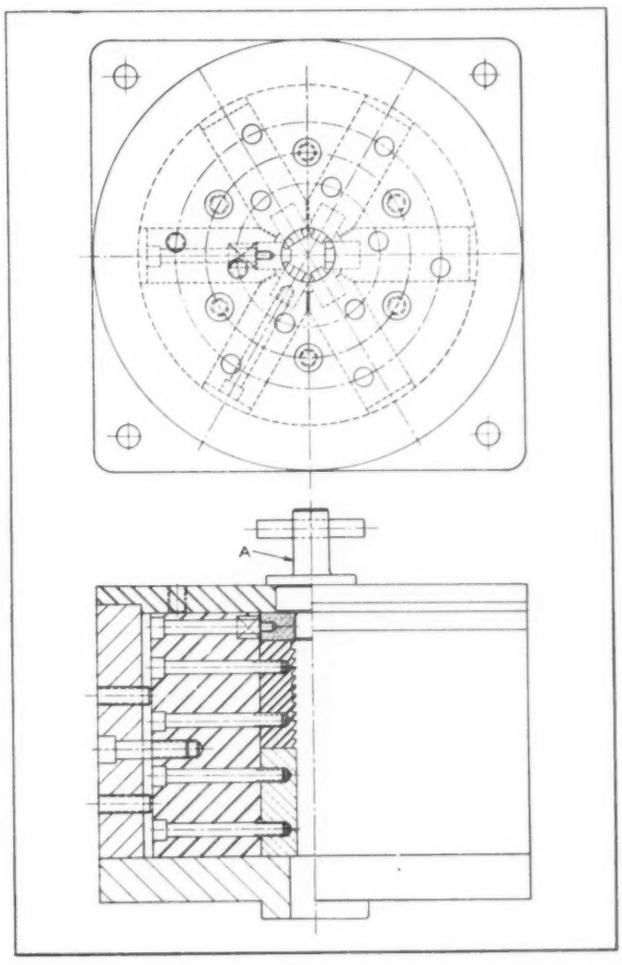


Fig. 2. Plan and Sectional Views of Broaching Fixture Illustrated in Fig. 1

Springfield Armory Tools Up

Operations Performed on Machines Recently Provided for the Quantity Production of Semi-Automatic Rifles and Machine Gun Barrels

By COLONEL GILBERT H. STEWART
Commanding Officer
United States Armory, Springfield, Mass.

MANUFACTURING operations that typified the progressive methods adopted by the United States Armory at Springfield, Mass., for the production of the new semi-automatic rifle and barrels for caliber 0.50 machine guns, were described in an article published in July, 1939, MACHINERY. The present article will describe some of the operations performed on milling machines, turret lathes, automatics, drilling machines, and dieing machines.

In Fig. 1 is shown a Brown & Sharpe automatic milling machine equipped with two form cutters for finishing both sides of rifle safety latches. The work-pieces are placed alternately in two fixtures, first with one side uppermost and then with the opposite side toward the cutters.

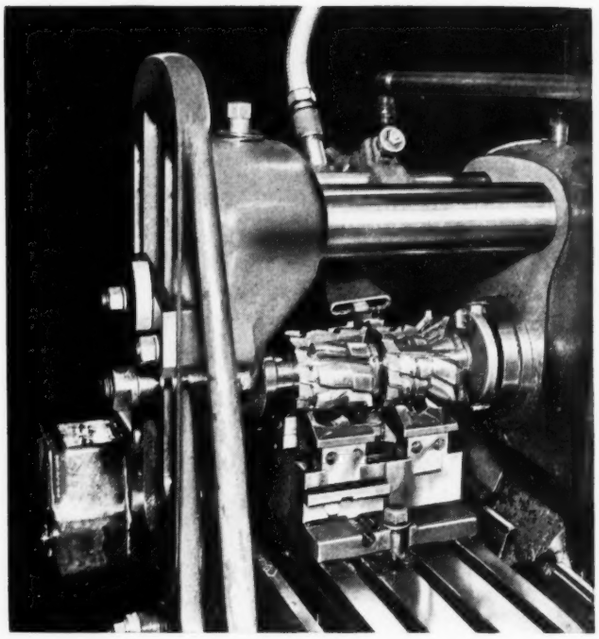


Fig. 1. Tooling Provided on an Automatic Milling Machine for Finishing the Top and Bottom Sides of Safety Latches

New turret lathes and automatics give high rates of production on various parts made from bar stock. In Fig. 2, for example, is shown a Warner & Swasey turret lathe that produces gas retainers for the caliber 0.50 machine guns from 3 1/6-inch diameter bars of stainless steel. When these parts leave the machine their wall is only 3/32 inch thick for a depth of approximately 7 inches.

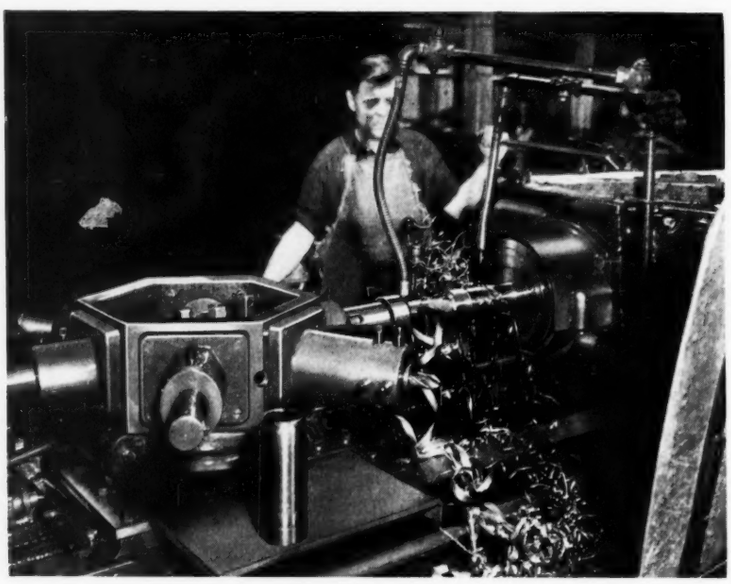


Fig. 2. Turret Lathe for Making Gas Retainers from 3-inch Steel Bars, the Finished Parts Having a Wall Thickness of only 3/32 Inch

In this operation the turret tools are used in the following sequence: Center-drill the end of the bar; drill a 2-inch hole to a depth of 7 inches; drill a 2 5/8-inch hole to about the same depth; bore the hole and form the inner end to a rounded contour; finish-bore the same surface; and, finally, counterbore the open end for a thread. During these cuts, tools on the square turret at the front of the machine take various turning and facing cuts on external surfaces and also cut the finished part from the bar. A finished part is seen in the foreground in Fig. 2.

The Brown & Sharpe automatic shown in Fig. 4 is tooled up for producing the stabilizer body of caliber 0.50 machine guns, also from stainless-steel bar stock. Finished parts are seen on top of the headstock. The sequence of steps in this operation is as follows: Feed stock to

for New Semi-Automatic Rifles

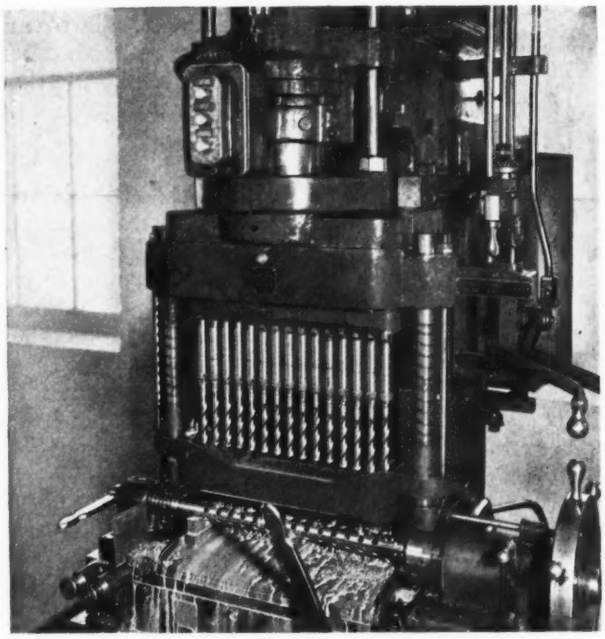


Fig. 3. Tooling on a Hydraulically Operated Drilling Machine for Drilling a Series of 86 Holes Around Barrel Jackets

turret stop; drill a 1 7/16-inch diameter hole and turn outside diameter with tools that are mounted on the same holder as the drill; drill a hole 13/32 inch in diameter and also finish-bore the larger hole to from 1.437 to 1.445 inches with tools on the same holder as the drill, the outside surface being recessed at the same time with a tool on the front slide; rough-form a rounded surface at the bottom of the large hole; cut a recess for an internal thread; and finish-form a radius at the bottom of the large hole, at the same time facing the end of the part with a tool on the same holder. At the end of these cuts the stock is fed forward to a second stop in order to obtain the desired length, after which the part is cut from the bar by means of the tool on the rear slide.

A particularly efficient method of drilling a large number of holes around barrel jackets is illustrated in Fig. 3, this operation being performed on a Barnes Hydram drilling machine. There are four rows of fourteen holes each and two rows of fifteen holes each. All holes of any one row are drilled simultaneously, 7/16 inch in diameter.

Two stops at the left-hand end of the machine provide for locating the work fixture to suit the drilling of the different rows, the holes being staggered in successive rows. Holes on opposite sides of the jacket are drilled in each work position, the drills being fed completely through the tube with the result that the job is finished in three indexings of the jacket. Indexing is accomplished manually by turning the handwheel at the right-hand end of the fixture, a lock-pin insuring accurate positioning of the work.

A Henry & Wright dieing machine installed in the press shop for the fast production of rifle handguard ferrules is shown in Fig. 5. Sixty ferrules are made per minute, or approximately 21,000 during an eight-hour day, allowing time for feeding new coils of stock through the machine, etc. The strip stock, fed into the right-hand end of the machine, passes over a nine-step progressive die. In the first die a small hole is pierced, as seen at the right-hand end of the strip that lies on top of the machine in Fig. 5. In the next die this hole is expanded in diameter and a 45-degree edge is formed around the hole. Then a rectangular slot is blanked, the slugs from the operation being raised into a bin at the top of the machine. This method is necessary because any burrs on the part must point upward during the succeeding steps of the operation.

The next die cuts a trimming slot around one side of the pierced hole, a pilot being entered into this hole to insure accurate location of the stock in this position. The distance to the next die was made twice the distance between preceding dies in order to insure required die strength and to guard against

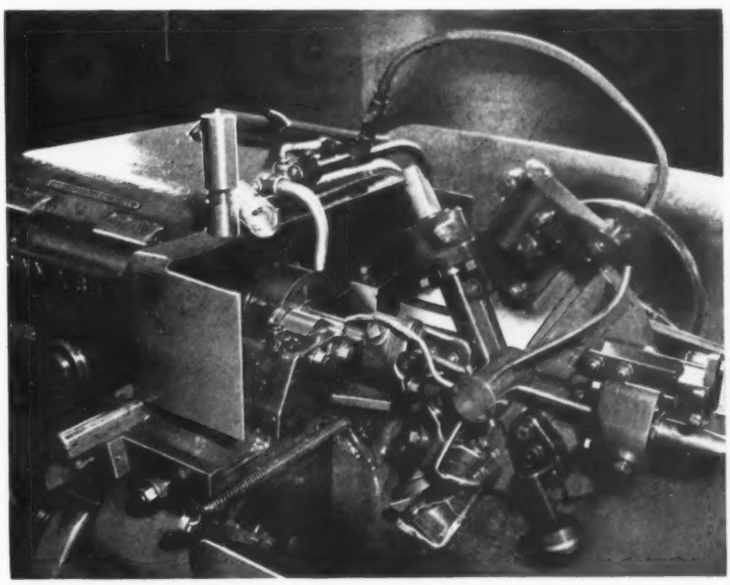


Fig. 4. An Automatic Tooled up for Taking a Large Number of Cuts on Bar Stock to Produce Machine Gun Stabilizer Bodies

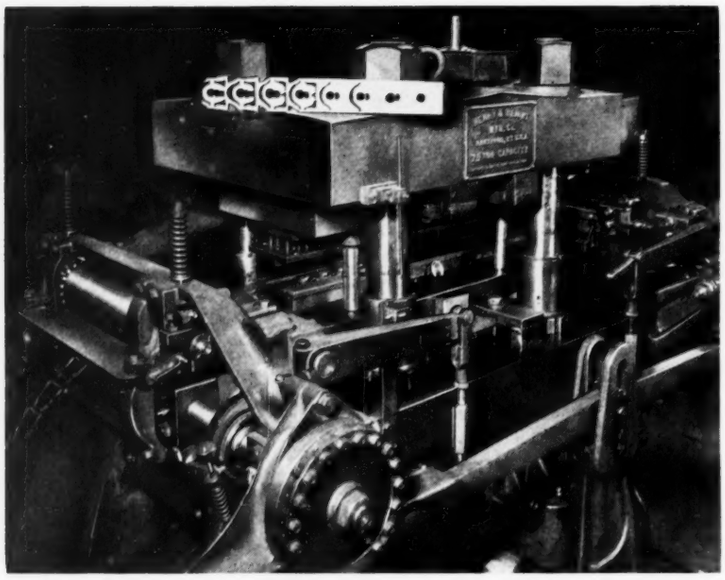


Fig. 5. Dieing Machine Equipped for Producing Hand-guard Ferrules at an Average Rate of 21,000 Pieces per Eight-hour Day

stretching of the weakened stock. In the next die, the stock is blanked on the opposite side of the pierced hole and slotted, so that the ferrule is now held only by narrow strips on opposite sides. The ferrule is partly formed in the next die (while the pierced hole is located from a pilot), and finish-formed in a similar die. Two ear-like depressions are next formed, after which the part reaches the final die that severs it from the stock and pushes it down through the die and out of the machine.

As Commanding Officer of the historic Springfield Armory, it is gratifying to know that the funds supplied by Congress for equipping the Armory have been so wisely expended by the officer and civilian personnel that our methods can be compared with pride to those used in the most progressive plants of private industry. There is still, of course, a considerable amount of old machinery in use and much to be desired in the way of modern shop buildings. This article, however, points the way to the types of other machine tools that should be made available to the Armory under the provisions of the recently passed National Defense Act.

Is Arc Welding a Difficult Process?

IN a recent statement by J. F. Lincoln, president of the Lincoln Electric Co., attention is called to the fact that there is nothing mysterious or difficult about arc welding. The operation is simple and easily accomplished. "The only thing that a welding operator has to do," says Mr. Lincoln, "is to hold the end of the electrode at a certain distance above the deposited metal and advance it along the seam to be welded at a certain speed. There is nothing more than that involved in the operation. It is neither complicated nor difficult. As a matter of fact, with the proper electrode, proper setting of the welding machine, and proper preparation of the work, it is practically impossible to make a weld which will not stand up in service, without having it so evident to the inspector that he would immediately reject it.

"The reason we hear so much about the necessity of skill and care in welding is largely due to the fact that the operation itself is so simple that it is difficult to find much about it to discuss in papers, lectures, and articles.... It is time that we get away from trying to make this very simple operation mysterious."

Mr. Lincoln further points out that when the metal is deposited by the shielded-arc electrode, the weld is definitely better than the parent metal it is joining. He calls attention to the fact that there has never been any failure on an insured pressure vessel that was made by the shielded-arc process.

In conclusion, Mr. Lincoln says: "When we recognize these facts, we will have done two things—first, we will have given the green light to one of the most economical processes now known for the production of many structures; secondly, we will have removed one of the fears which the uninitiated have developed regarding a perfectly normal manufacturing operation."

* * *

"Streamlined" Writing

The word "streamlined" seems to have caught the popular fancy to an extent that few other words have. It is being used in a few cases where it actually applies, and in a great number of cases where it is wholly unsuitable. Everything is streamlined, even to the "plans for the program for a convention," which is one of the latest uses of the word that has come to our attention. The use of words that are misapplied simply because they are popular at the moment is an indication of the word limitations of the writer. Good writers use only words that are accurately descriptive of the subject in hand; they avoid fancy, exaggerated, and popular expressions.

Cast Versus Welded Press Construction

By I. PATRICK, Chief Engineer
Brooklyn Division, E. W. Bliss Co.

THE comment on cast frame versus welded construction in press design by A. E. Gibson, past-president of the American Welding Society, in March MACHINERY, page 130, has been noted with interest. As Mr. Gibson points out, the two classes of equipment under consideration are very different. Mr. Gibson's suggestion that the tensile strength figures for an admittedly good modern iron (Meehanite) were compared with "the *lowest* obtainable in welding," prompts the comment that there has also been a rather well defined opinion that, in past publicity, comparisons have been made between a rather good grade of weldable steel plate with unduly poor grades of cast iron.

In the comment published in March MACHINERY, tensile strength is stressed. It should be remembered, however, that this is not a true value, in that it takes the maximum recorded value of the test and divides it by the original cross-section area of the specimen. This value is materially affected by the ductility of the metal.

It is obvious that the Bliss company has great faith in rolled steel, as the majority of the machines that it builds are used to shape steel by drawing, bending, and other cold flowing processes. The plasticity of steel that makes this possible is, however, highly undesirable in precision press frames. In building bridges and in equipment making use of designs duplicating bridge sections, the use of rolled steel shapes in which the material is economically distributed offers obvious economies.

In compact, highly stressed, and complex structures, however, the problem is rather different. In either cast or welded construction, we actually start with a casting and crop its risers. Then, for a welded structure, a billet must be rolled and rerolled. Next a plate is laid out and gas-cut, which is expensive and leaves an appreciable amount of scrap. Further, for a good job, the edges should be machined; then, after considerable rigging, the joints are welded. Welding is obviously another and expensive casting process; in addition, it is influenced to a considerable extent by the human factor. The welded structure must be put into an annealing oven to relieve the severe stresses set up by local expansion in welding. The pieced frame must be machined, just as the part cast to final shape must be machined. Obviously, there is a point where the complexity of structure and of intermediate processes may make the welding method uneconomical.

If the machine frame made by weldable steel were more rigid and more durable than that made of modern cast iron, that added value might offset the cost of added operations. Higher combined carbon or iron carbide content, however, gives the casting harder finished surfaces. It also gives much higher compressive strength than is found in low-carbon weldable steel; and as most iron used for presses is in the beam section structures, the high compressive strength is in favor of the iron. The shock-absorbing or vibration-damping property of iron is also valuable in press frames, although it may not be required in such types of equipment as were referred to in the comment in March MACHINERY; each case must be considered with regard to its own requirements.

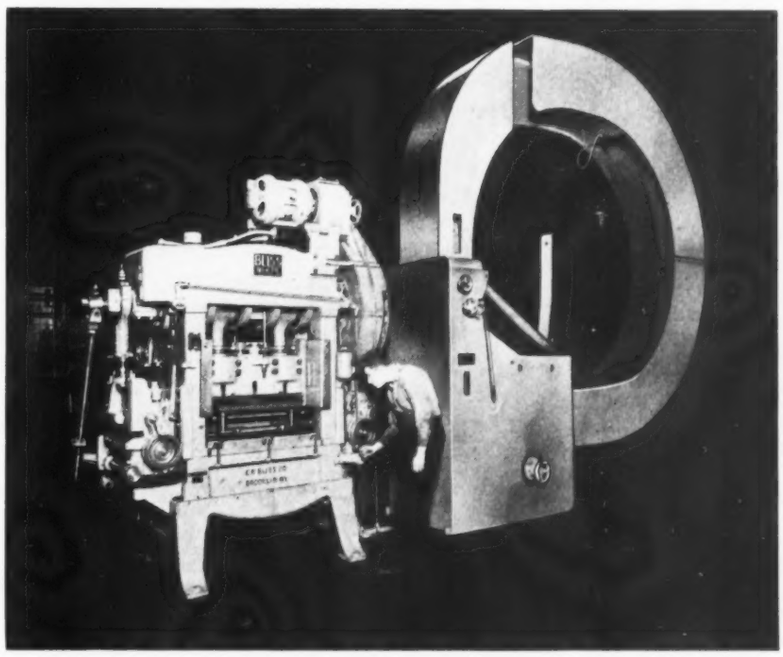


Illustration Showing how Cast and Welded Construction can Advantageously be Used in Conjunction. The Bliss Press Shown is Constructed with the Beam Members of the Bed, Crown, Slide, and Other Parts Made from Modern High-strength Cast Iron, while Rolled Steel and Welding are Used to Advantage in the Coil Cradle, Gear Guard, Splash Guard, Feed-rolls, and Tubular Connections

The Manufacture of Shell Forgings

IN a British plant, forgings for shell bodies are made from heated billets by the extrusion process, as well as by the more usual methods of piercing and drawing. A 2000-ton hydraulically operated extrusion press is used in the production of forgings for the body of the 3.45-inch high-explosive shell.

The general procedure in manufacturing forgings by the extrusion process is shown by the diagrams in Fig. 1, which illustrate stages in the formation of the hollow cylindrical forging from a steel billet, 6 5/8 inches in diameter. The essential equipment consists of the die-ring *A*, the cylindrical punch *B*, and the supporting ram *C*, which closes the throat of the die during the first part of the downward travel of the punch.

Before being placed in the die, the billet is heated to approximately 1750 degrees F. in a gas-fired furnace. It is supported in the die by the shoulder just above the throat. When the punch descends, the billet is pressed down into the throat of the die, as will be apparent from the second diagram, until, at the stage illustrated in diagram 3, it is forced against the supporting ram *C* and occupies the entire space between the ram and the punch. The ram *C* now recedes rapidly, and continued downward motion of the punch extrudes the work through the die. The downward movement continues until just before the shoulder in the die is reached.

The continuation of the punch stroke after withdrawal of the ram *C* results in the extrusion of the steel through the annular space formed by the die throat and punch extension at a rate which is four times as fast as that at which the punch advances. It is apparent, therefore, that the base or lower end of the forging travels ahead of the punch, and is not subjected to drawing strain during the formation of the walls of the forging. In the older process of piercing and drawing, where the forging is drawn through dies by a punch, damage is sometimes done to the base. This objection is overcome in the extrusion process.

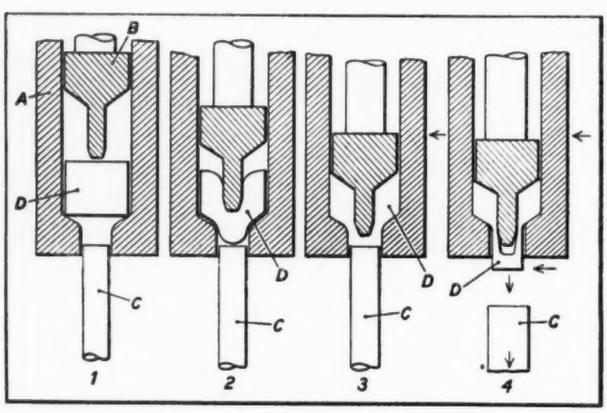


Fig. 1. Diagram Showing Method of Producing Shell Forgings by the Extrusion Process

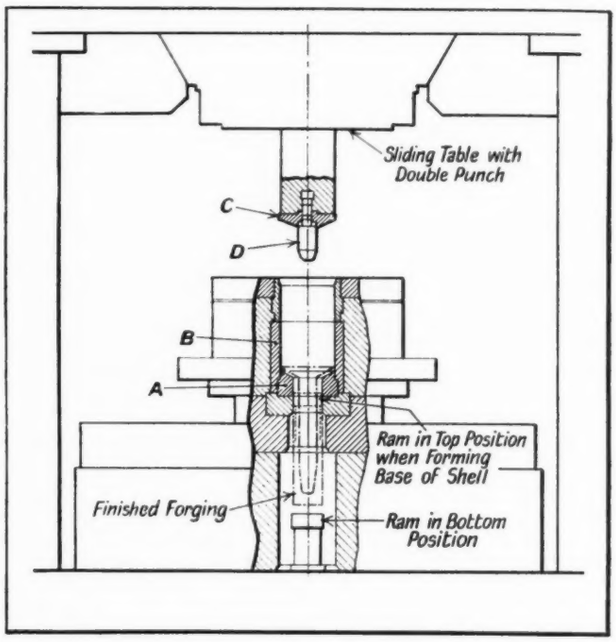


Fig. 2. Arrangement of Tool Equipment Used on Press for Extrusion Operation

Two punches *B*, Fig. 1, are carried by the horizontal slide of the press, the die being accommodated in a holder in the lower part of the machine. The two punches are used in turn, the slide being indexed after each extrusion, and while one punch is in operation on a heated billet, the other is being dipped into one of two containers filled with a mixture of graphite and whale oil. Coils, in which cold water is circulated, keep the lubricant in each container cool.

At the center of the horizontal slide, midway between the two punches, is the "grab," or jaws, for removing the forged shell. The supporting ram below the die raises the work to the unloading position during its return motion, after which the traverse of the horizontal slide causes the grab to engage the flange formed on the end of the forging by the tools. By fully raising the head carrying the punch-slide, the work is lifted completely from the dies by the grab, a pair of tongs being then employed to remove the forging.

Thus there are three positions for the horizontal punch-slide, the two working positions in which one or the other of the punches is in line with the dies, and the intermediate position where the flange of the forged work is engaged by the grab before the punch-head is raised fully. The indexing movement of the punch-slide is actuated by a lever from a vertical shaft.

A sectional view showing the tools used for the

by the Extrusion Process

extrusion process and their relative positions in the set-up may be seen in Fig. 2. An outline of the finished forging is shown, while the upper and lower positions of the supporting ram below the die are indicated. In its upper position, the supporting ram enters the die for about 1/2 inch, and it is to this position that it returns after the working stroke of the punch to eject the forging so that it can be engaged by the grab, as already described.

The die assembly comprises the throat piece *A* through which the heated billet is extruded, and the built-up hollow cylindrical portion *B*, both members being supported by a spigoted base-piece, and the assembly being enclosed in the die-holder, as shown. The annular portion *C* of the punch registers with the bore of the die member *B*, while the end *D* enters the throat and forms the bore of the forging.

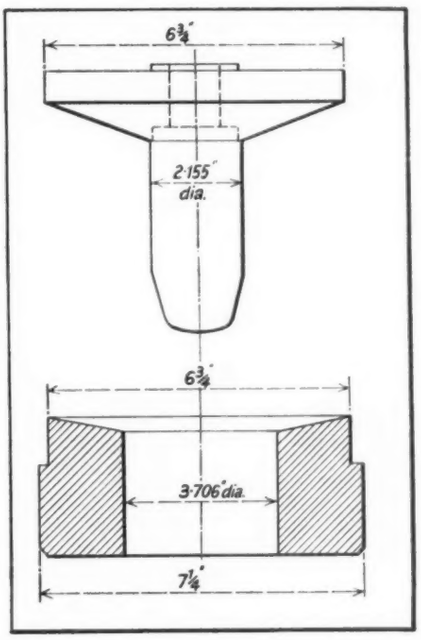


Fig. 3. Details of Extrusion Punch and Die

Details of the punch and the extrusion die are seen in Fig. 3, while the sectional view Fig. 4 shows the finished forging. There is a clearance of 0.025 inch between the diameter of the annular disk portion *C*, Fig. 2, of the punch and the walls of the hollow cylindrical portion of the die. The flange formed at the end of the forging is produced by the space between this disk portion and the conical upper surface of the extrusion die when the punch is at the bottom of its stroke.

The hydraulic pressure necessary for the operation of the press is obtained from an accumulator and intensifier. The total pressure available is 2000 tons. With the accumulator alone, the pressure available is 1500 pounds per square inch, while the intensifier increases this to 2200 pounds per square inch.

Hydraulic pressure of 600 pounds per square inch holds the lower ram up in the throat of the die to support the billet when it is placed in position. A valve is then actuated, which admits pressure to the operating cylinder on top of the press, a pressure gage registering the pressure as it builds up. When the pressure reaches 1400 pounds per square inch, an electrical contact is made in the pressure gage, and a relay is operated which opens the valve on the cylinder of the supporting ram. The result is that the ram falls rapidly, and the extrusion commences, the billet being extruded through the die as already described. On the return movement of the hydraulically operated punch-head, the punch is withdrawn to clear the dies, and the ram is then raised to eject the extruded forging part way.

The finished forgings are allowed to cool slowly on a raised sand bed. This bed is served by an endless plate conveyor. Before being placed on the conveyor, the forging is stamped with distinguishing letters to indicate the cast and the makers. There is another conveyor at the opposite side of the bed. This runs in the opposite direction to the loading conveyor and serves to carry the forgings, after cooling, to a cold saw, which removes the waste material, or flange, from the end.

Both conveyors are controlled by push-buttons, and at the unloading station the conveyor is set in operation as required to insure that there is always a plentiful supply of forgings for the saw. The work is located on the cold saw by a vee, and is clamped in position hydraulically by a jaw mounted in a vertical slide. A gage is used for setting the work in the vee to insure that the forging is cut to the required length of 13 inches from the end of the bore.

* * *

There is no field in which air-conditioning has been so universally applied as in the railroad field. Air-conditioning has probably done more to make railroad travel comfortable than any other railway improvement in the last fifty years. On January 1, this year, there were 11,715 air-conditioned passenger cars in operation on American railroads. Of this number, approximately 6600 were ordinary coaches, while the Pullman Co. had approximately 5100 air-conditioned cars in operation.

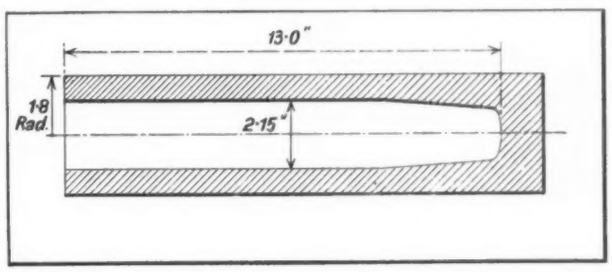


Fig. 4. Shell Forging Produced by the Extrusion Process

Hemming Dies for Folding over Edge of Metal to Form Reinforcement

By CHARLES R. CORY*

A HEMMING operation is one in which the edge of a sheet-metal part is folded over on itself to obtain a double thickness of the material for reinforcement purposes. Hemming is performed in one operation with the punch and die shown in Fig. 1. The part handled by this die has the hemming flanges already formed to vertical positions, as shown at *W*, Fig. 3. Cams *A* and *B*, Fig. 2, are attached to punch-shoe *C* by gibs *D*, as shown in Figs. 1 and 4. The gibs also serve as guides for the cams. The cams are in the "in" position when the die is open; they so remain until they come in contact with the beveled side surfaces of member *E*, or until space *F* has been closed up.

The beveled surfaces of the cams bend the flanges of part *W* to a 45-degree angle while the punch is traveling from the position shown in Fig. 3 at the start of the operation to the position where gap *F* between *B* and *E* has been closed. This completes the first stage of the operation. The disappearing type gage pins *G*, which extend upward to the proper gaging height when the die is open, are pushed down by the beveled surfaces of the cams. They prevent the part from shifting or changing its position in the die until the completion of the beveling operation.

Cams *A* and *B* are held in their "in" positions by the vertical surfaces of driver plates *I* at the beginning of the operation (Fig. 3). As soon as the beveling operation is completed, the beveled surfaces of the cams come in contact with the beveled surfaces of die *E*. The angular driving surface of the cam is then in line with angular surface *H* of the driving plate. This alignment of the members is insured by making distance *F*, measured from the beveled surface of the cam, equal to distance *Y*. This leaves the cam free to slide on the beveled surface of die-block *E* and on beveled surface *H* of driving plate *I*. As the cams are gradually forced outward, punch insert *N*, Fig. 2, comes in contact with the 45-degree flanges on the work and flattens them, as shown at *W*. The cam travel is limited by pins *K* which operate in slots in the cams.

On the up stroke of the punch, the cam is forced inward again by beveled surface *H* of the driver plate. In this design, springs are not used for returning the cams to the "in" position when the die is opened, the beveled surface of the driver plate at *L* and of the cam at *M* serving to actuate the cams. The driver plates should be beveled sufficiently so that if the cam rebounds, or if it is pushed to its outer position at any time when the die is open, the beveled surfaces will still force the cam to the "in" position on the down stroke before the first stage of the hemming operation begins.

A part with a hem on a straight, rather than a curved, break line, can be formed with a much simpler type of hemming die, as shown at the start and finish of the hemming operation, respectively, by Figs. 5 and 6. Pressure-pad *A* holds the part, which was flanged in a previous operation, down against *B*. Hemming die *C* has a wall *D* which prevents the part from bulging outward. Radius *E* is made as large as the part permits. As the punch continues its downward stroke, flange *F* is forced inward by radius *E* and bent until it is flattened.

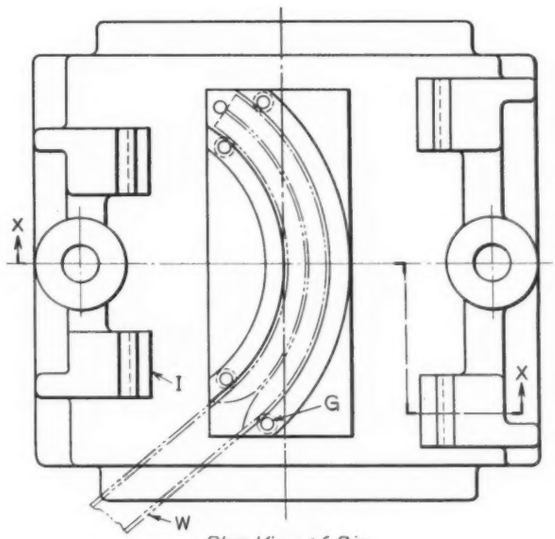
The process would not be very successful for a part having a hem break line with a sharp sweep. Such a break line would result either in a stretching of the metal, if the sweep of the hem is similar to that shown in Fig. 8, or in an excess of metal, if the sweep is similar to that shown in Fig. 7. In either case, the die construction shown in Figs. 5 and 6 cannot be used.

In the dies shown in Figs. 1 and 6, the hemming is completed in one operation from a previously flanged condition. If there are no preliminary flanging operations, the two-operation die arrangement shown in Figs. 9 and 10 can be used. Part *W*, shown in Fig. 9, is flanged for a hem from a flat condition by a pressure-pad type of forming die, the hem flange being flattened by the die shown in Fig. 10.

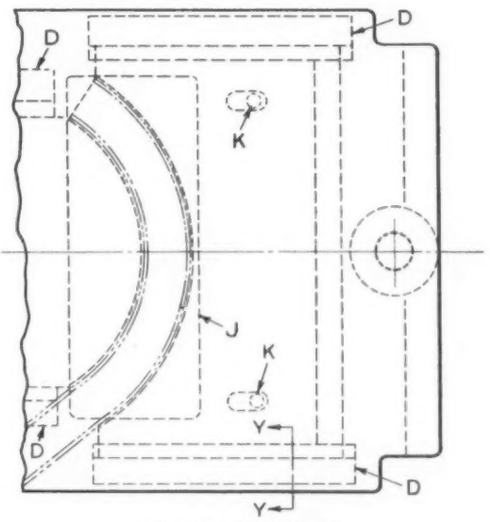
It may be more convenient to use a cam die for flanging, as shown in Fig. 11, instead of the type in Fig. 9. At the start of the operation (Fig. 11), cam *A* is confined between pressure-pad *B* and end-stop *C*. As the punch continues to travel downward, the cam flanges the part vertically around the corner of die *D* until space *E* is closed up. When this occurs, driver plate *F* comes in contact with cam *A*, causing it to travel inward as well as downward at the proper angle for flanging the hem. At the end of the hemming operation, as shown in Fig. 12, the pressure-pad bottoms on the punch-shoe and the flange is bent or formed to such an angle that it can be easily flattened in a die similar to the one shown in Fig. 10.

If the break line of the hem is a straight line, a vee type flange die, like the one in Fig. 13, can be used instead of a die of the type shown in Fig. 9. The die in Fig. 13 is the least expensive to make and is used, therefore, whenever the hem break line is straight.

*Die Engineer, Fisher Body Division, General Motors Corporation.

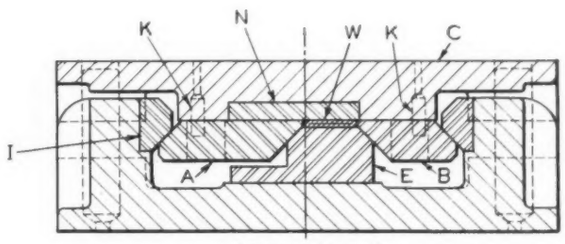


Plan View of Die



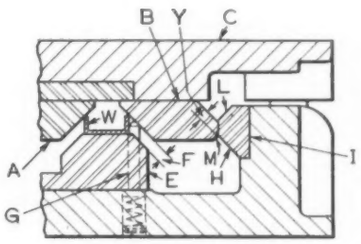
Plan View of Punch

FIG. 1



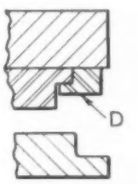
SECTION X-X
Die Closed

FIG. 2



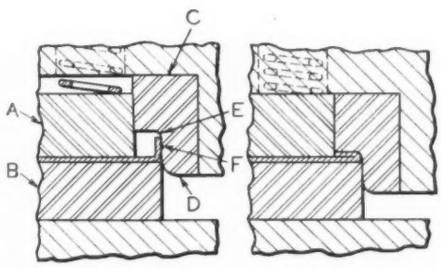
SECTION X-X
Start of Operation

FIG. 3



SECTION Y-Y

FIG. 4

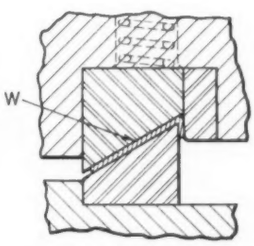


Start of Operation

FIG. 5

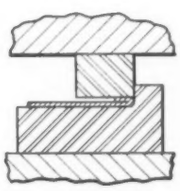
End of Operation

FIG. 6



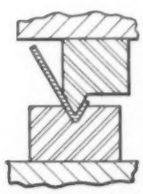
Forming Flange for Hem

FIG. 9



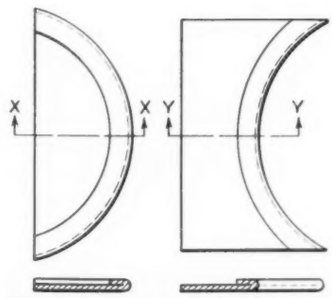
Flattening Hem

FIG. 10



Vee Type Die for Forming Flange for Hem

FIG. 13

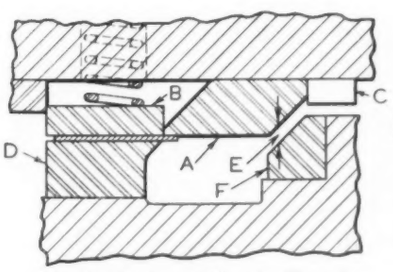


SECTION X-X
Excess Metal

FIG. 7

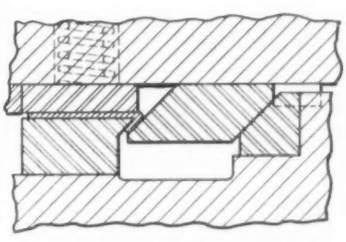
SECTION Y-Y
Stretch of Metal

FIG. 8



Start of Operation in Forming Flange for Hem in Cam Type Die

FIG. 11



End of Operation in Forming Flange for Hem in Cam Type Die

FIG. 12

Examples of Hemming Dies for Folding Over Edge of Metal to Form Reinforcement

Engineering News Flashes

The World Over

Ball Bearings that have been Run up to 90,000 R.P.M.

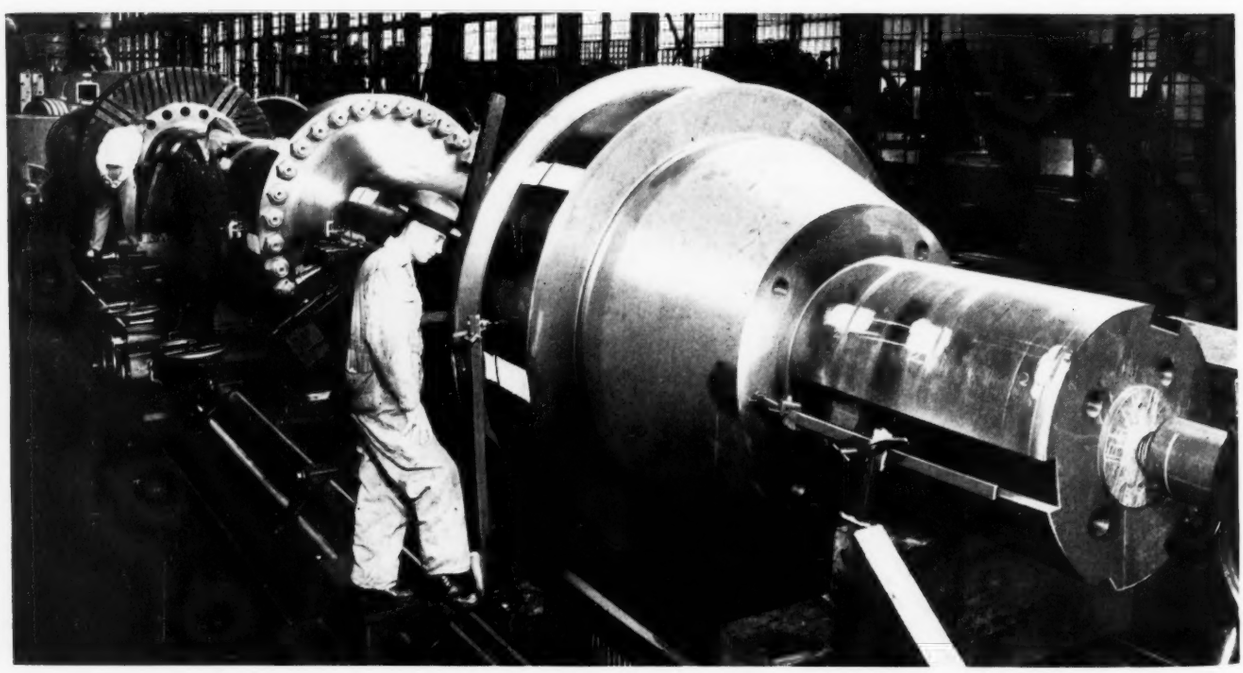
Ball bearings made by the Ransome & Marles Bearing Co., Ltd., Newark-on-Trent, Great Britain, and applied to a small pneumatic grinder made by Desoutter Bros., Ltd., of London, are claimed to have been run up to 90,000 R.P.M., although the makers of the grinder mention a maximum speed of 70,000 R.P.M. at an air pressure of 100 pounds per square inch. It is stated, however, that speeds of from 80,000 to 85,000 R.P.M. have often been reached, and that 90,000 R.P.M. has been actually recorded. The bearing has a bore approximately 5/16 inch in diameter. It is made with extremely close limits of accuracy, and is fitted with a Bakelite cage.

The grinder consists of an impulse turbine-driven spindle contained in a duralumin casing. It weighs only 12 1/2 ounces, and has a length of 6 1/2 inches. The ball bearing takes care of the load at the rotor end of the spindle. At the grinding end, a carefully designed bushing bearing is provided, which is lubricated from an oil bath and kept cool by radial vanes, between which the exhaust air passes. The grinder can be used with either high- or low-pressure air. The low-pressure speeds are from 30,000 to 50,000 R.P.M., and the high-pressure speeds ordinarily from 50,000 to 70,000 R.P.M.

The Amplidyne Generator—A New Means of Electric Control

At the recent meeting of the American Institute of Electrical Engineers in New York, engineers of the General Electric Co. described the new Amplidyne generator, which, in reality, is a device used for controlling large amounts of electric power. Industry has already begun to take advantage of the benefits afforded by this system of control. In the field of machine tools, it has been applied to a multiple-head boring mill for obtaining rapid and

Testing the Alignment of a Combined Generator and Water-wheel Shaft in a Mammoth 10-foot Swing Lathe in the Shops of the Allis-Chalmers Mfg. Co., Milwaukee, Wis. The Assembled Shaft, as Shown, Weighs Approximately 160,000 Pounds and Has an Over-all Length of 36 Feet. It was Manufactured for the Three 30,000-K.V.A. Vertical Water-wheel Generators Built by Allis-Chalmers for the Chickamauga Dam



accurate positioning of the cutting tools. In this instance, the operator presets the next cut to be made by means of dials which indicate feet, inches, and thousandths of an inch. When one cut is completed, he presses a button and the cutting tool is automatically placed in position for the next cut. In the steel industry, several applications have been found for this system of control. It has been successfully used to control the speed of reeling of continuous steel strip; to obtain constant tension and uniform strip speed on steel-strip polishing apparatus; to synchronize the speed of flying shears with that of the last stand of rolls on hot strip mills; and to control the excitation of large synchronous motors driving structural steel mills.

Malays Applied the Diesel Engine Principle a Thousand Years Ago

According to an item in the *Army and Navy Register*, the principle of high-compression ignition, on which the action of the Diesel engine is based, was discovered by the primitive peoples of the Malay Peninsula long before their contact with the white man. Centuries later, this principle was rediscovered and applied by Diesel in the type of engine that bears his name.

One of the fire-lighting devices of the Malays, the so-called "fire piston," described by ethnologists as perhaps the most remarkable primitive invention, is now in the collection of the Smithsonian Institution. It consists of a tightly wrapped plunger which is forced into a wooden cylinder, at the bottom of which is placed some tinder. The plunger, suddenly hit by the hand, compresses the air beneath it, thereby generating sufficient heat to ignite the tinder, which is then taken out, fanned into a flame, and used to start a fire.

This invention spread throughout the Malaysian area, and is believed to be at least a thousand years old. It is doubtless the most efficient of primitive fire-making methods, which included the rubbing of sticks together, the getting of sparks from flint, and the use of the "fire drill" to produce heat by friction.

This is by no means the only instance of an invention by a primitive people antedating some of the most brilliant developments of the present era. A striking instance is the discovery a few years ago that a difficult problem of the American textile industry had long ago been solved on the Fiji Islands. This was the problem of winding a spool of cord in such a way that it could be unwound with even tension. Engineers in this country worried over that problem for years; and when a successful device was finally developed, it was based essentially on the same principle as is found in the Fiji twine ball in the National Museum collections. This fact prevented the newly developed American device from being patented, although its free use by the textile industry as a whole has resulted in a saving of millions of dollars.

World's Longest Belt Conveyor System Nearly Ten Miles in Length

A belt conveyor system 9.6 miles long, which will furnish the aggregate for the construction of the Shasta Dam now being built by the Department of Reclamation for irrigation purposes in California, is the longest belt conveyor system ever installed. The conveyor idlers are being furnished by the Chain Belt Co. of Milwaukee, Wis. Over 16,000 troughing and return belt idlers will be used in the construction of this transportation system, which is twice as long as any previously built.

In the manufacture of these idlers, 18 miles of steel tubing, 11 miles of steel shafting, over 10 miles of angle iron, over 50,000 malleable castings, and 83,000 roller bearings will be used. Twenty miles of 36-inch wide, six-ply belting will be required for the system. The belting is being supplied by the Goodyear Tire & Rubber Co. of Akron, Ohio. This transportation system will have a capacity for conveying 1100 tons of material an hour at a speed of 550 feet per minute. It will operate on a 24-hour basis, and will be illuminated for its entire length with sodium vapor lights.

Electric Couplings for Marine Diesel Engine Drive

The Diesel engines of the motorship *Mormacpenn*, recently delivered to the Moore-MacCormack Lines, have no mechanical connections between them and the gears that turn the propeller. Power is transmitted from the engines to the gears through a new form of electric coupling, built by the Westinghouse Electric & Mfg. Co. These couplings provide an electric cushion, as the power is transmitted electrically across the air gaps of the couplings. They prevent the pulsations of engine torque from reaching the gears, and also enable the engine to be connected to the propeller instantly.

The operation of the coupling is quite simple. It consists of two rotating members, revolving one inside the other. One is mounted rigidly on the engine shaft, and the other is connected to the gear. The external member has salient field poles, connected to the ship's direct-current auxiliary power supply for excitation. Rotating inside this field is the inner member with a squirrel-cage winding. The mechanical rotation of the field member creates a rotating magnetic field which induces currents in the squirrel cage. The interaction of the resulting magnetic fields creates powerful forces which cause the squirrel cage to follow the field except for a small slip, just as the secondary of a squirrel-cage induction motor follows the rotating magnetic field set up by the stator. The couplings are remarkably efficient, the efficiency being better than 97.5 per cent. In this particular application, they are used to connect four engines rated at 2225 H.P. at 240 R.P.M., driving a single screw through a two-pinion single reduction gear.

EDITORIAL COMMENT

No matter how collected, in the final analysis it is industry and business, and the men who work in industry and business, whether as managers or as manual workers, who ultimately pay the taxes that support the Government. For that reason, everyone who works in industry in any capacity ought to have a clear picture of what the free and easy Government spending of the last eight years has meant to this country, and what the bill is that everyone is being asked to help pay.

According to the figures recorded by the Treasury Department and certified to Congress in the annual reports of the Treasury, the present Federal Administration will have spent, in the eight years ending July, 1941, over $65,000,000,000. If these expenditures are compared with those of past Administrations, it will be found that the present Administration in its eight years of office, has spent 58.5 per cent as much as all the previous Federal Administrations in 144 years. In other words, it has taken $65,628,000,000 to run our Federal Government in the last eight years, as compared with $112,203,000,000 in all the previous 144 years.

Industry Pays the Bill of a Wasteful Government

Furthermore, the present Administration has collected over $40,000,000,000 in taxes during the last eight years, as compared with $91,600,000,000 in the preceding 144 years; and, at the same time, the national debt has been almost doubled in eight years of peace. This nation has borrowed in eight years almost exactly the same amount as it borrowed to conduct the World War, including the billions that were lent to England, France, Italy, and other nations.

The works manager of a certain large plant makes it a point to select, personally, all the important machinery used in the various shops. He knows what he wants, and he gets the best equipment available for the purpose. First cost is not a primary consideration; he spends tens of thousands of dollars for a single machine without "batting an eye."

However, after selecting the machine, he seems to feel that his work is done, and from that moment on, the buying of auxiliaries and supplies is done by the purchasing department, largely on a price basis. Lubricants, belting, and similar things are bought in the same manner as one would buy pig iron or cement. The purchasing agent feels that he has done his best if he buys, whenever he can, at the lowest price. He believes, with Benjamin Franklin, that "a penny saved is a penny earned." But if Franklin had lived today, he might have amended this by saying "a penny wisely spent may save hundreds of pennies."

The Best Machine Deserves the Best in Supplies

The result of the buying policy of this plant, therefore, is that high-grade machinery is supplied with lubricants and belting of inferior quality; yet, it is well known that each per cent of belt slip means 1 per cent loss of production, and an additional expense of 1 per cent in fuel cost. This fact is not always considered when belting is bought. As for lubricating oil, the same methods are often followed. Poor lubricants not only cause power losses—that is, fuel losses—and reduce production; but what is worse, they cause the expensive machine to turn itself into junk in a short time. Poor belting does not actually injure the machine, but poor lubricants do.

If it is worth while to buy the best machine on the market to obtain the best production results, it is also worth while to buy the lubricant best suited for that machine. The extra cost per gallon is small in comparison with the cost of the machine. Production executives should give the same care to the selection of oil, belting, and other supplies, as is given to the selection of machines and tools, because savings in the buying of inferior supplies may defeat the purpose sought in buying a superior and expensive machine.

The word "standard" is considerably overworked. In technical writing, it is frequently used when the writer actually means "regular" or "ordinary." For example, one sometimes sees the expression "standard swing" of a lathe when what is meant is the "regular swing" of the lathe. The diameter of a pipe tap, for example, is a fixed, definite, standardized dimension; it is a standard diameter. But one should not say: "The standard pulley diameter is 14 inches on this machine."

Ingenious Mechanical Movements

Mechanisms Selected by Experienced Machine Designers as Typical Examples Applicable in the Construction of Automatic Machines and Other Devices

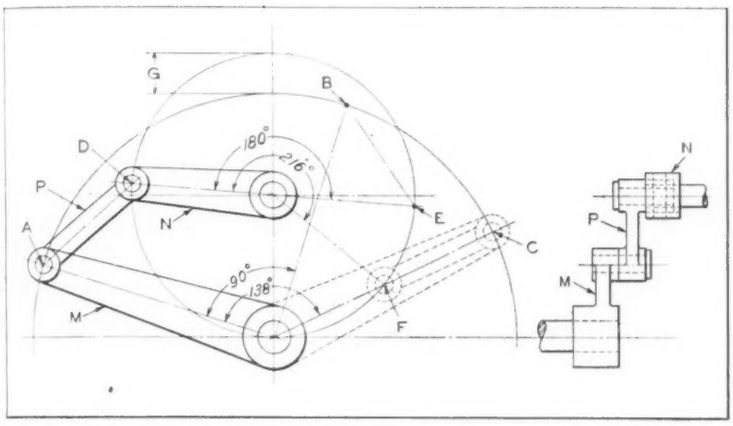


Fig. 1. Crank-and-link Mechanism for Increasing Angular Movement of Driven Shaft

Mechanism for Increasing Angular Movement of Shaft

By M. JACKER

A crank-and-link type mechanism that produces a somewhat greater angular movement than either of the designs described in September, 1939, MACHINERY, pages 20 and 21, or that described in January, 1940, page 151, is shown in Fig. 1 of this article. When the driving crank *M* travels from point *A* to *B*, through an angle of 90 degrees, the driven crank is rotated through an angle of 180 degrees. This represents a ratio of 1 to 2 in the increase in angular movement. When crank *M* oscillates 138 degrees, between points *A* and *C*, the driven crank will oscillate 216 degrees, between points *D* and *F*, at a ratio of 1 to 1.56. For this ratio *G* equals one-sixth the length of crank *M*, and the length of link *P* equals one-half the length of *M*.

In Fig. 2 is shown an arrangement for oscillating a crank that has too great an angular motion for practical operation by means of the connecting-rod of a revolving crank. In this case, crank *D* must have an oscillating movement of 144 degrees or more. This is accomplished by the introduction of an auxiliary crank *C*, which obtains its angular motion of 72 degrees from connecting-rod *E* driven by a revolving crank (not shown).

The connecting-rod of this mechanism could, of course, be connected at any point on crank *C;* any position other than the one shown, however, would necessitate a change in the length of the stroke, although the 72-degree oscillating motion of crank *C* would remain unchanged. The motion of crank *D* is not uniform, but varies from a ratio of about 1 to 1.44 up to 1 to 2.55, a 1 to 2 ratio of oscillation being obtained for the half or complete angular motion. The complete angular motion of crank *C* is 72 degrees, and that of crank *D* 144 degrees, giving a ratio of 1 to 2. The like angles *a*, *b*, *c*, and *d*, representing movements of crank *C*, produce unlike angular movements of crank *D*, as shown at a^1, b^1, c^1, and d^1, at ratios indicated in tabular form.

Converting Horizontal to Vertical Oscillation by Simple Mechanism

By MICHAEL GOLDBERG

The linkage mechanism shown on page 180 of November, 1939, MACHINERY, must have an appreciable amount of play in the pivot joints in order

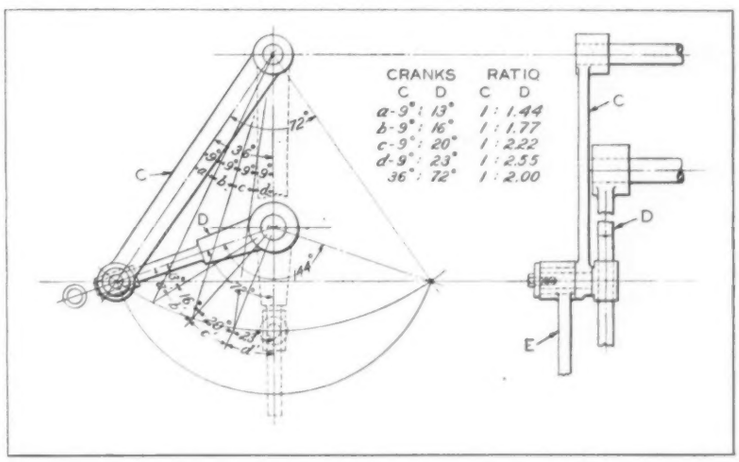
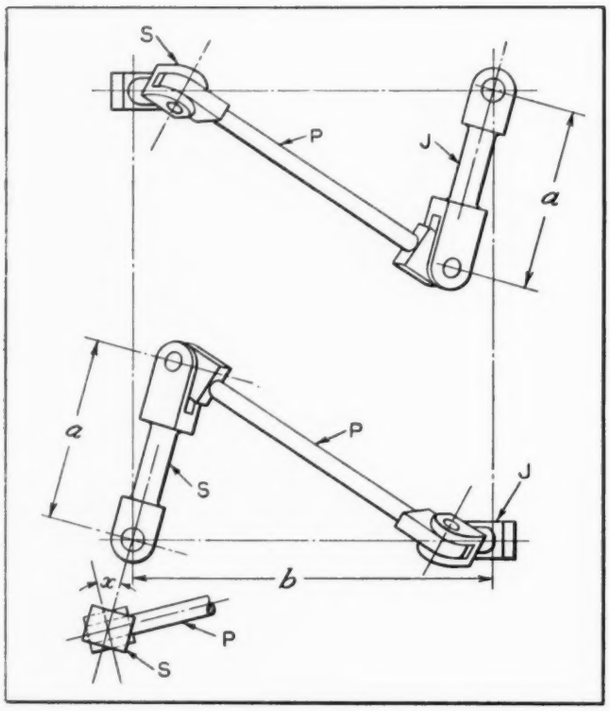


Fig. 2. Arrangement for Oscillating a Crank that has Too Great an Angular Motion for Operation by Connecting-rod of Revolving Crank



Simple Mechanism for Converting Horizontal to Vertical Oscillation

to operate successfully. If a few calculations are made, on the supposition that levers J and S are rigid bars, it will be found that the connecting-rod P would be strained in torsion during the oscillating motion. In any practical mechanism, made as described and illustrated in the previous article, all distortion for which relief is not provided by the play allowed by the pivots will be taken up by the various parts of the mechanism.

However, the desired conversion from oscillation in the horizontal plane to oscillation in the vertical plane can be accomplished by a linkage mechanism of fewer parts which was devised by G. T. Bennett and described in *Engineering* in 1903. If applied to the mechanism in question, as shown in the accompanying illustration, it would require levers J and S to be of equal length, and the length of connecting-rod P to be the same as the distance between the axes of rotation of levers J and S. Then each of the universal joints shown would be replaced by a simple pivot joint. The angle between the pivots in rod P would be a right angle, while the sine of the angle x between the pivots in lever J would be equal to the ratio of the length of lever J to the length of rod P, or sine $x = a \div b$. Lever S would, of course, have the same angle x between its pivots as lever J.

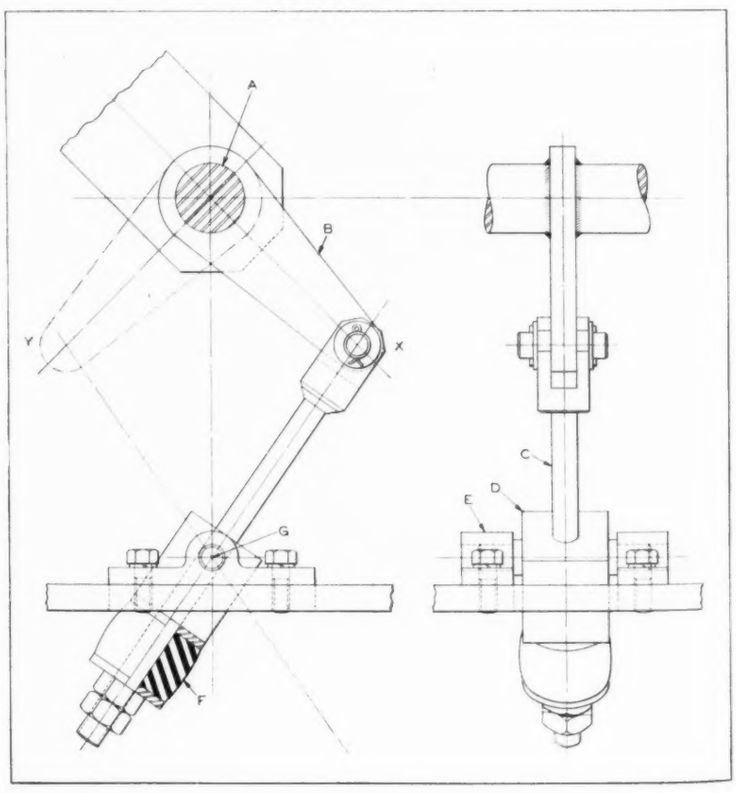
The Bennett linkage is not an approximation; it is a mathematically correct method of converting an oscillating motion in one plane into an oscillating motion in another plane. There is no limit to the amount of oscillation; the cranks or levers may execute complete rotations or even continuous rotation if the links are designed to clear each other.

Two-Way Stop for Angular Movement of Shaft

By J. L. HELMINEN

The mechanism shown in the accompanying illustration comprises an arrangement for stopping the rotation of shaft A in two extreme angular positions by means of a single lever arm B attached to the shaft. The shaft C is connected to the lever arm by a pin, and is a slip fit through the trunnion D. The trunnion revolves around pin G and is held securely to the baseplate by the two bearing brackets E.

The rubber shock absorber F on the end of shaft C stops against the trunnion block when shaft A is in either of the extreme positions X or Y. The position of the shock absorber is adjusted by means of the nut and lock-nut shown. By moving the trunnion block and its supporting brackets to either side of the center line, the extreme positions at which the angular movement of shaft A is stopped can be changed to suit a wide range of operating requirements.



Mechanism for Stopping Angular Rotation of Shaft

Welding Machine of Unusual Capacity

THE illustrations show an automatic welding machine designed to utilize an ultimate welding current of 4000 amperes. This machine was built by The Linde Air Products Company and is used in the welding shop of the Blaw-Knox Co., Pittsburgh, Pa. It has been employed successfully for welding sections ranging in thickness from 1/2 inch to 2 1/4 inches. On material as light as 1/4 inch and as heavy as 2 3/4 inches, experimental work is still under way.

A typical job performed on the machine is the welding of a circular shell of 1/2-inch plate, as shown in Fig. 2. The welding speed was 16 inches per minute on the first side welded, and 18 inches per minute on the reverse side. A current of 900 amperes was used for the first bead, and 700 amperes for the finishing bead. In the case of 2 1/2-inch plate, the current would be approximately 1600 amperes, and the welding speed 8 inches per minute on both sides. The ultimate current capacity of 4000 amperes has not been used, inasmuch as the maximum thickness that can be welded with this machine has not yet been determined.

* * *

The filling station owner who erected the sign "Taxes Collected Here—We Also Sell Gasoline" was not altogether facetious. The American Petroleum Institute reports that there are 1,400,000 gasoline pumps in use in the service stations in the United States, and that the average tax collected for national, state, and local governments for the gasoline served by each gasoline pump is $691.

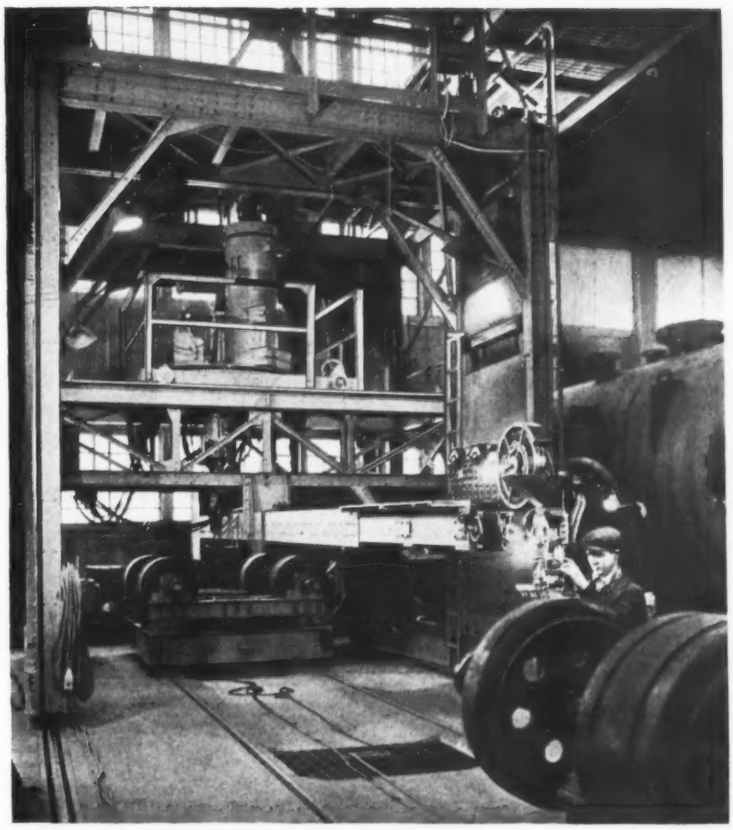
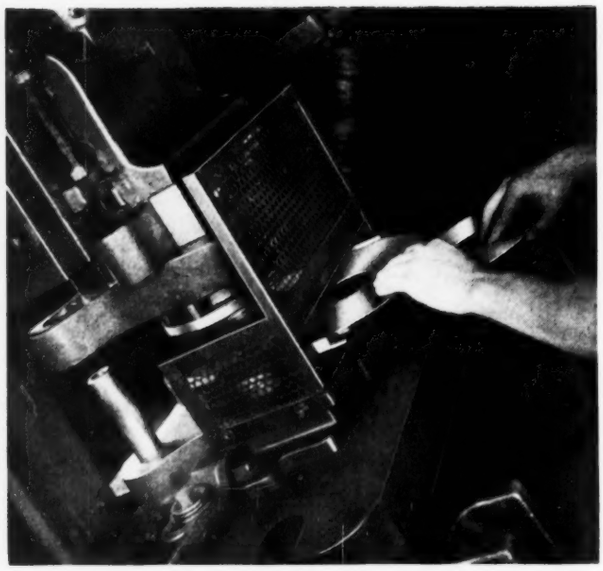


Fig. 1. (Top) Automatic "Unionmelt" Welding Machine with Ultimate Current Capacity of 4000 Amperes, Installed in the Welding Shop of the Blaw-Knox Co. Material up to 2 1/4 Inches in Thickness has been Welded with this Machine

Fig. 2. (Bottom) Machine in Operation on a Cylindrical Shell Made of 1/2-inch Plate. Note that no Flame or Filler Metal can be Seen, as the Welding Zone is Protected by a Special Granular Composition which is Picked up by the Suction Tube to be Used Again

Die Design for

A Review of the Principles Involved in Designing Dies for Inclinable Presses so as to Insure Maximum Production and Safety of Operation—First of Two Articles



"Safe" Die Design does not Require the Operator to Put His Hands into the Danger Area in Order to Place or Remove the Blanks

THERE are definite reasons why presses are designed and constructed so that they can be operated in an inclined position. The greatest advantage of the inclinable press is that it can be so operated that the danger element is eliminated and production greatly increased. The safety factor cannot be over-emphasized. However, the use of an inclinable press will not protect the operator or increase production unless the dies used are specifically designed for operation in that type of press. The design of dies for inclinable presses requires the application of some fundamental principles which vary from those governing conventional die design for upright presses.

Safety in punch press operation generally involves the provision of auxiliary devices, such as swinging guards, roped bracelets, moving screens, two-button switches, and other equipment designed to protect the operator. The use of such equipment is desirable, but the real solution of the safety problem is to make it unnecessary for the operator to place his hands in the danger zone—between the punch-holder and the die-shoe. When this has been accomplished, through proper die design, the real objective has been achieved. The addition of protective devices is then an important, but secondary, consideration.

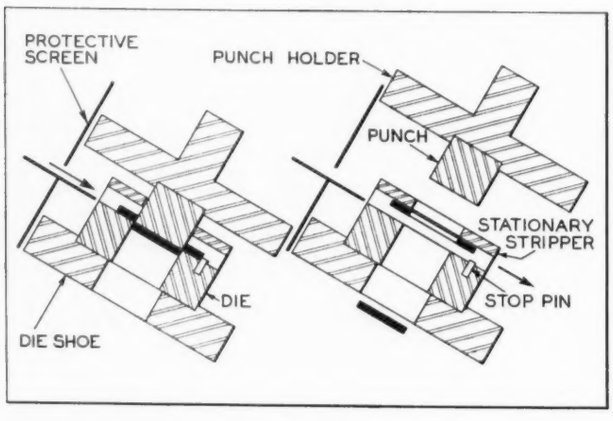


Fig. 1. Simplest Type of Self-unloading Die Used in an Inclinable Press

It is generally assumed that safety devices or designs that protect the operator handicap the efficiency of the operation to some degree. The operation of correctly designed dies in an inclinable press is an outstanding exception to this.

This article will deal with dies for manually fed inclinable presses, stressing the safety features achieved through proper design. An incidental advantage is that production is greatly increased in most cases, though the cost of the designs suggested, in general, do not appreciably increase the tool cost.

The accompanying illustrations are greatly exaggerated to bring out fundamental principles of design. All superfluous details, such as guide posts, bushings, screws, dowels, etc., are omitted. In order that the action of the dies may be more readily understood, they are shown in both shut and open positions. The dies are drawn in an inclined position—their actual position when mounted in the press—so that the movement of the stock can be better visualized. In the designs illustrated, only the fundamental types of dies are included. It should be kept in mind that the variations and possible combinations of the elementary principles are unlimited.

In the operation of presses, the stock is in one of two forms—either unit stock or strip stock—the unit stock being punched only once, and the strip stock being fed across the die and punched several times. It will be noted that each design illustrated is intended specifically for either unit stock or for strip stock operation.

Elevated Stationary Stripper-Plate Design

Fig. 1 shows a simple type of die designed for an inclinable press. This design is intended for piercing or blanking unit stock. In appearance, the design is similar to that of the conventional type of stationary stripper-plate dies used in up-

Inclinable Presses

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Cleveland, Ohio

Die Designs that Require the Operator to Place His Hands as Shown are Dangerous. (Photographs Courtesy Reliance Electric & Engineering Co.)

right presses for progressive operation on strip stock. However, the operation is quite different.

The stock is placed in the die by slipping it through a protective screen. This screen should have a horizontal slot which will admit the stock, but will prevent the operator from inadvertently placing his hands into the die set. The stock slides across the face of the die and comes to a stop against the pin shown. When the ram descends, the slug is forced through the die-block. The outer piece is forced up on the punch, to which it clings until the up stroke of the ram causes it to come in contact with the stationary stripper plate.

This stripper plate, instead of being fitted to the thickness of the stock, is elevated approximately an inch above the die-block. The reason for this is that when the blank is stripped from the punch, with the stripper plate elevated in this way, the tilt of the press causes the leading edge of the blank to fall clear of the stop-pin. The blank then slides over the pin and through the throat of the press. In this way, the die automatically ejects the material. This eliminates practically all the material-handling time, because the press can usually be loaded during the up stroke and the start of the down stroke of the ram. It should be noted that the safety screen shown could not be used if the operator had to remove the material from the die.

One stop-pin is shown to illustrate the action. Actually, two or more stop-pins may be used, so located that they will not catch in the hole, or holes, punched out. In the operation of this die, and the other dies to be described, the operator is at no time required to place his hands in the danger area in order to place or remove material.

The Use of Knock-Out Pins

Knock-out pins, or KO pins, as they are sometimes called, are important. Their action is shown in Fig. 2. These pins are short lengths of cold-rolled steel which are a slip fit in holes in the punch-holder. The pins rest on the stripper plate and extend approximately 2 inches above the punch-holder shank. The stripper plate itself is supported by conventional stripper bolts (not shown). The knock-out pins are actuated by a knock-out bar, which is an adjustable bar secured in a horizontal position to the ways on both sides of the ram. There is a slot through the ram which clears this bar.

Near the top of the up stroke of the ram, the knock-out pins come in contact with the stationary knock-out bar. As the ram continues to rise, the pins force the stripper plate down, and the blank is stripped at the top of the stroke, so that the leading edge of the falling blank will clear the stop-pins, as mentioned, and the blank will slide out of the die. The type of die illustrated in Fig. 2 is used for piercing and blanking operations on unit stock.

The design shown in Fig. 3 is used for dies in which, because of space requirements, only one knock-out pin passing up through the shank can be used. In some types of presses, there is provision for this type of knock-out pin action only. This type of die is used for piercing and blanking operations on unit stock. As will be noted, a stripping sleeve is used instead of a stripper plate. The

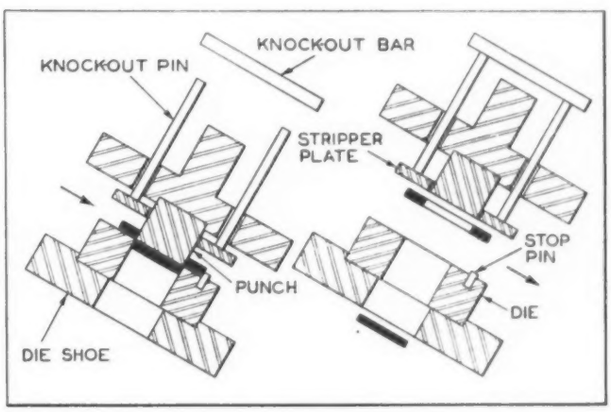


Fig. 2. Diagrammatic Illustration of the Action of Knock-out Pins

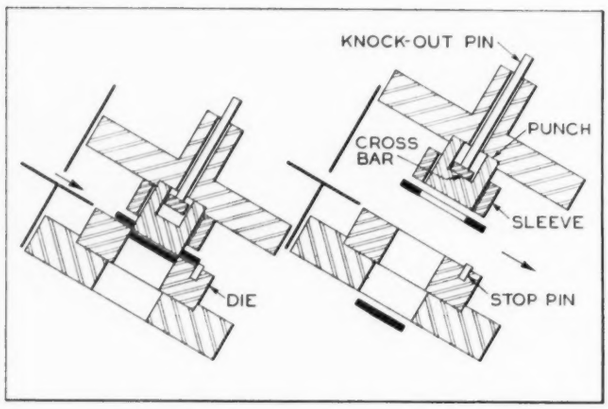


Fig. 3. Die Design where Only One Knock-out Pin Can be Used

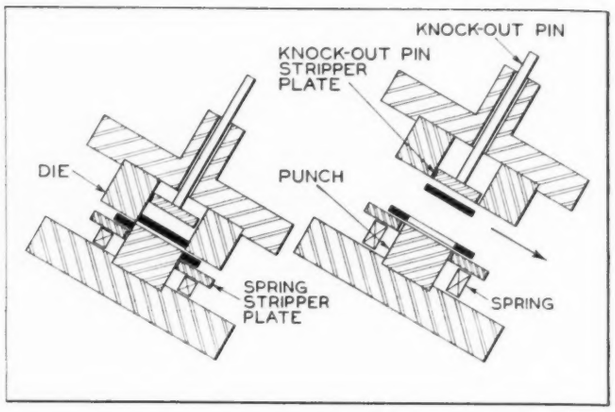


Fig. 4. Inverted Die, with the Punch below and the Die Above

sleeve is secured to a cross-bar placed in a slot cut through the punch. At the top of the ram stroke, the knock-out pin forces down the cross-bar and the stripping sleeve. Since the material is stripped at the top of the ram stroke, the stock will automatically be removed from the press.

Inverted Type of Die

In Fig. 4 is shown an inverted type of die, generally used for operations on strip stock. The punch is in the lower member and the die in the upper. Since the piece punched out does not pass through the die, no taper, or relief, is required on the die walls. Hence, the punching produced will be the same throughout the life of the die. Ordinarily, the taper in the die causes a burr after the die has been ground down a considerable amount. The worn down die will also produce a slightly larger blank.

With this design, the stock is entered through the side of the die. Suitable protective screens should be used, so that only the stock can enter the danger area. As the ram descends, the punch forces the blank up into the die, where it remains until it is stripped at the top of the ram stroke by the pin-actuated stripper plate. From this elevation, the blank falls clear of the die set. The outer piece is forced down over the punch and depresses the spring-actuated stripper plate. As the ram starts up, the spring stripper plate simultaneously strips the outer piece from the punch. The strip remains on the punch, and is ready to be advanced to the new position.

It should be noted that if spring strippers were used to remove the blank from the upper member, the springs would force the blank back into the hole from which it was punched. The operator would then have to separate the blanks from the scrap after running the strip through the die. This condition is extremely awkward in that the strip cannot be positioned against a stop-pin when the previous blank has been pushed back into the stock.

Compound Die for Inclinable Press

Fig. 5 shows the simplest form of compound die for use in an inclinable press. Variations of the design would, of course, be required, according to the conditions in each case. This type of die can be used for punching either strip stock or unit stock. When unit stock is used, the stock should be entered through a protective screen in front of the die. If possible, the outer edge of the stock should be allowed to project out through the screen when the stock is in place. In this way, the operator does not have to let go of the piece during the stroke of the press. After the piece has been punched, the operator pulls the projecting part back through the screen and does not have to reach into the danger area to remove the scrap. In case the stock is in square pieces, it may be entered through the screen in a diagonal position, so that the corner will project through the screen.

When strip stock is used, the work should be fed from the side of the press through proper screen guards. The

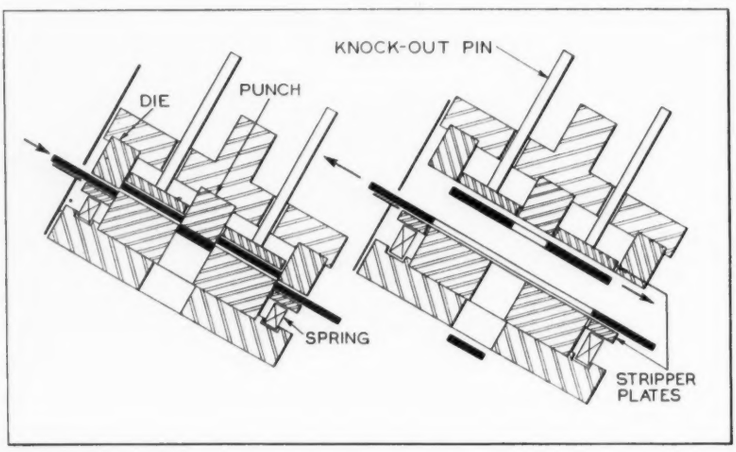


Fig. 5. Simple Form of Compound Die for Use in an Inclinable Press

operator discards the scrap after feeding the strip across the die. The operation of this die is greatly facilitated, as none of the pieces punched out are forced back into the hole from which they were punched.

In the operation of the die, the center piece is forced down through the die-block. The middle ring is forced up into the upper member, where it remains until stripped at the top of the ram stroke. The outer piece is forced down on the blanking punch. After the punching operation, the outer ring is removed from the die manually, there being no entanglement of three pieces produced.

In the second and concluding installment of this article, the design of separating dies, stripper-plate suspension for knock-out pins, spring-operated stripper plates, and die design for making simple V-bends will be discussed.

* * *

Grinding Master Connecting-Rods in an Italian Aircraft Plant

The main bore and face of master connecting-rods are ground in one operation in an Italian aircraft plant by employing the Bryant internal chucking grinder here illustrated. This machine is equipped with a two-spindle wheel-slide, one grinding wheel being employed for grinding the bore, and the other for finishing the connecting-rod face. Approximately 0.015 inch of stock is removed from both the bore and face surfaces.

The tolerance on the hole is plus or minus 0.0005 inch. The machine is equipped with a sizing device having a finger that rests on the surface being ground while the operation is in progress to indicate when the bore reaches the required size. The production rate is ten connecting-rods per hour.

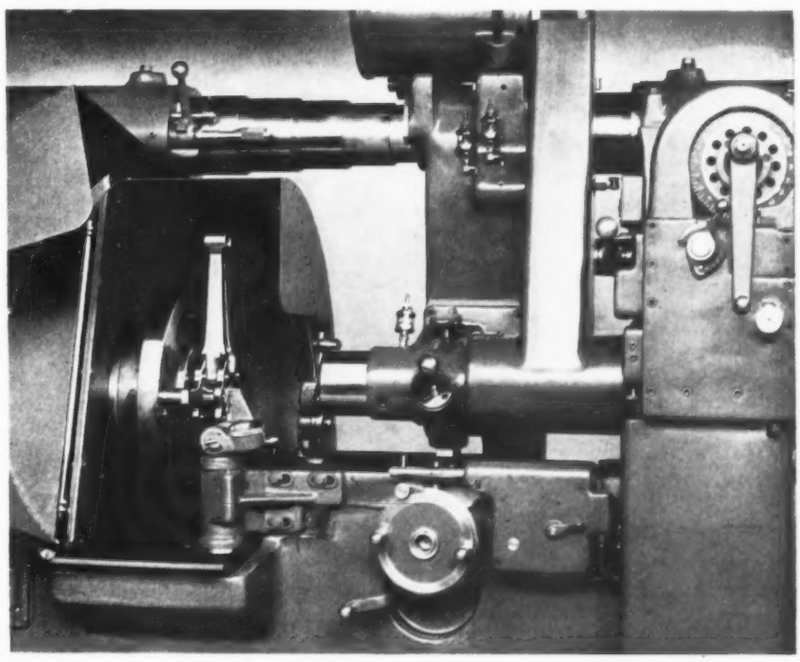
Mechanical Engineers Observe Sixtieth Anniversary

On April 7, the American Society of Mechanical Engineers observed its sixtieth anniversary. It was on April 7, 1880, that eighty mechanical engineers met at Stevens Institute of Technology in Hoboken, N. J., and organized the American Society of Mechanical Engineers, with an initial membership of 189. The founder members promulgated what have remained to this day the objectives of the organization: To promote the art and science of mechanical engineering and the allied arts and sciences; to encourage original research; to foster engineering education; to advance the standards of engineering; to promote the intercourse of engineers among themselves and with allied technologists; and, severally and in cooperation with other engineering and technical societies, to broaden the usefulness of the engineering profession to industry, community, and the world. The first president was Robert Henry Thurston, a pioneer in mechanical engineering education.

By degrees the Society has grown until today it has 15,000 members and seventy-one local sections throughout the United States and Canada. In common with the civil, electrical, and mining engineers, it owns and occupies, since 1906, the Engineering Societies Building at 29 W. 39th St., New York City, a building that was the gift of Andrew Carnegie to the engineering societies, for which, however, the societies themselves provided a conveniently located site in the heart of New York City.

* * *

The first refrigerator railway freight car, according to *The Inventor*, was constructed in 1868. Now most of our food supply depends on these cars.



Internal Grinding Machine Equipped with Two Wheel-spindles for Grinding Both the Main Bore and the Surrounding Face of Master Connecting-rods for Italian Airplane Engines

Increasing the Utility of Die-Castings by Inserts

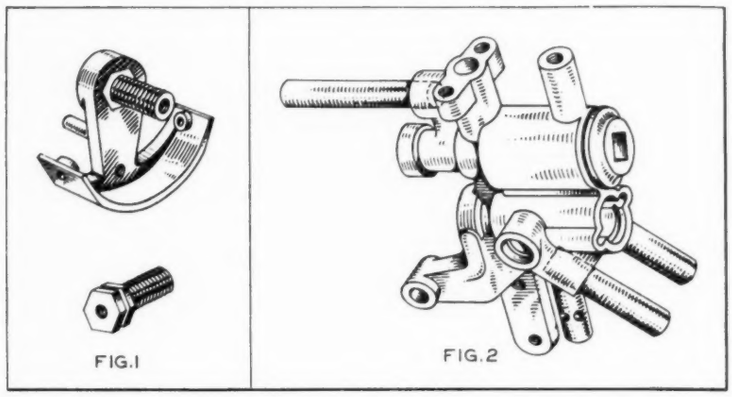


Fig. 1. Brass Insert Made on Screw Machine. When Cast in Place, the Hexagon Head Prevents Turning and the Groove in the Head Anchors the Insert. Fig. 2. Four Copper Tubes Cast into a Fitting

INSERTS frequently add materially to the usefulness of die-castings. Some specific examples of this practice will prove instructive to the engineer concerned with die-castings, because sooner or later he is likely to be able to employ some of these to advantage; or they may suggest a related type of application out of which some unusual economies will develop. With this in mind, a group of applications of inserts are illustrated and briefly described in this article.

Although many inserts are cast in place, others are applied with equal advantage and sometimes at lower cost subsequent to casting. For a given result, the less expensive way is obviously preferable. Inserts cast in place can be securely locked and accurately located. On the other hand, casting an insert in place requires that it be put into a hot die, an operation which slows up the casting cycle and thereby increases the cost. Thus it is profitable to weigh the advantages, drawbacks, and relative costs of both methods of application, and then choose the one yielding the best all-around results.

Brass parts such as shown in the lower view, Fig. 1, made in an automatic screw machine, constitute useful inserts. In this case, the insert is turned from hexagon stock and threaded internally and externally. It is cast in place. The hexagonal head prevents the part from turning in the casting, and a groove turned in the head prevents it from being pulled out.

Thin-walled tubes often form useful inserts and when cast in place, as are the four tubes shown in Fig. 2, the end of the tube need not be threaded, which would weaken the thin wall materially; nor is it necessary to tap holes to receive the tubes. Generally, however, the tubes must be slipped over pins to locate them in the die and prevent them from collapsing under the pressure of the metal.

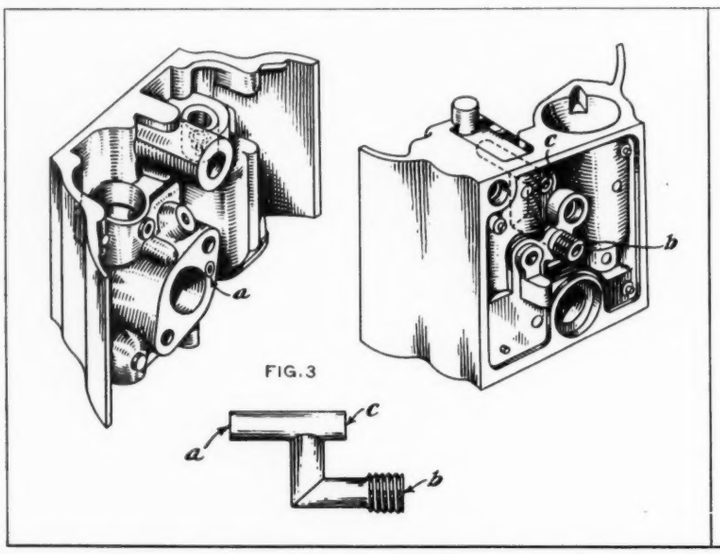


Fig. 3. Aluminum Die-casting with Two Inserts, One of which, a Bronze Forging or Sand Casting, is Shown Separately. Corresponding Letters and Dotted Lines Indicate Its Location in the Casting. The Other Insert is a Screw Machine Part Shown Dotted Near the Top of the View at the Left

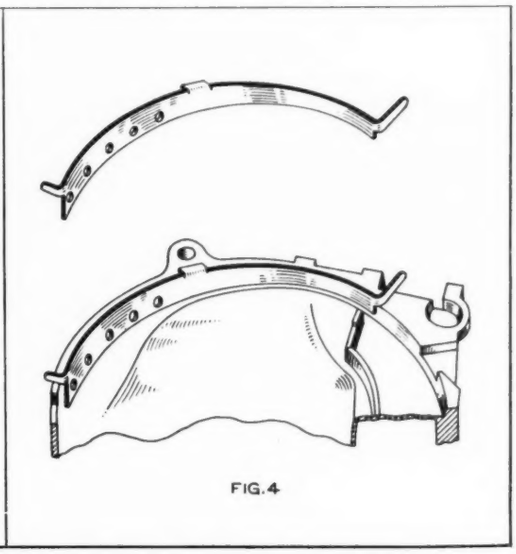


Fig. 4. Stamped Steel Insert Shown Separately and in Place to Form a Wear-resistant Surface. The Projections that Support the Insert in the Die are Subsequently Ground off

In this instance, all the tubes are in the parting plane of the die, or parallel to it, and thus require cores or slides that move in the planes of their axes, thereby increasing the die cost. Tubes placed at right angles to the die parting can be carried on core-pins integral with the die body.

Fig. 3 shows a carburetor part containing two inserts, both cast in place. One is a brass screw-machine product, threaded internally and containing a valve seat, as shown by dotted lines in the sketch at the left. The other is an L-shaped bronze fitting, shown in the view at the bottom of the illustration, one leg of which is threaded at *b* before being cast in place. A cross-hole (joining the holes drilled and tapped in the parallel legs of the insert before it is cast in place) is drilled through the part after the die-casting is made, as prior drilling would, in this case, result in the holes of the insert filling with metal, since one end of the cross-hole would in that case remain open when the insert was placed in the die. Holes *a*, *b*, and *c* are closed by pins forming part of the die, over which the insert is slipped, the pins serving to hold the insert in the correct position while the casting is formed around it. The walls of the insert are so thick as to prevent collapse as a result of the pressure applied to the metal in the die. In this, as in many other cases, the inserts are harder than the body of the casting and have greater corrosion resistance. The body of the casting in this particular example is an aluminum alloy.

Inserts that Increase Wear Resistance

Inserts made from harder metal than the casting alloy are often used to afford increased wear resistance. This is the case with the sheet-steel insert cast into a fare-register part shown in Fig. 4. This insert is used to avoid undue abrasion from coins deposited in the machine. It is anchored and positioned by the slender extensions at the ends, which fit into recesses in the die and are ground off flush with the outside surface of the piece subsequent to casting. The holes in the insert become filled with molten zinc alloy, which also helps to anchor the piece securely.

In Fig. 5, a flexible member harder than the zinc alloy casting is shown cast in place, being held in slots in the die, with the outer end projecting from the die. The clamping is facilitated by parting the die in a plane at right angles to the hub axis and half way through the hub. The part of the steel insert embedded in the casting may be either bent to some anchoring shape or may have holes in it which fill with metal to secure a firm anchorage.

Fig. 6 shows two parts of a vegetable slicing machine, one of which has one insert and the other eight. The eight inserts on the upper part are the circular steel knives that do the slicing. This piece is cast in a die parted through the axis; the knives are placed in slots which fit them closely. The gear is cast integral with the cylindrical hub which spaces and holds the knives securely. In the die for the mating part, which is hollow, the parting is in the plane through a central web and at right angles to the shaft which forms the insert; hence, the insert is merely pushed into a hole in the die, no cross-slide being needed. The extending ends of the shaft form the journals on which the drum rotates, the gear being cast integral with the drum.

Gears and Gear Sectors Used as Inserts

Gears and gear segments often form integral parts of die-castings, but in the example shown in Fig. 7, a gear sector is formed from steel and is used as an insert in the die-casting, the object being to secure wear-resistant gear teeth. The web of the insert has holes in it into which the metal flows when the casting is made, locking the sector securely to the die-casting.

An interesting use of inserts is seen in the assembly of an eccentric shaft and connecting-rod for a small air compressor of the diaphragm type, illustrated in Fig. 8. There are three separate zinc alloy die-castings; the inserted shaft runs through and unites them all. One of these castings *A* is the

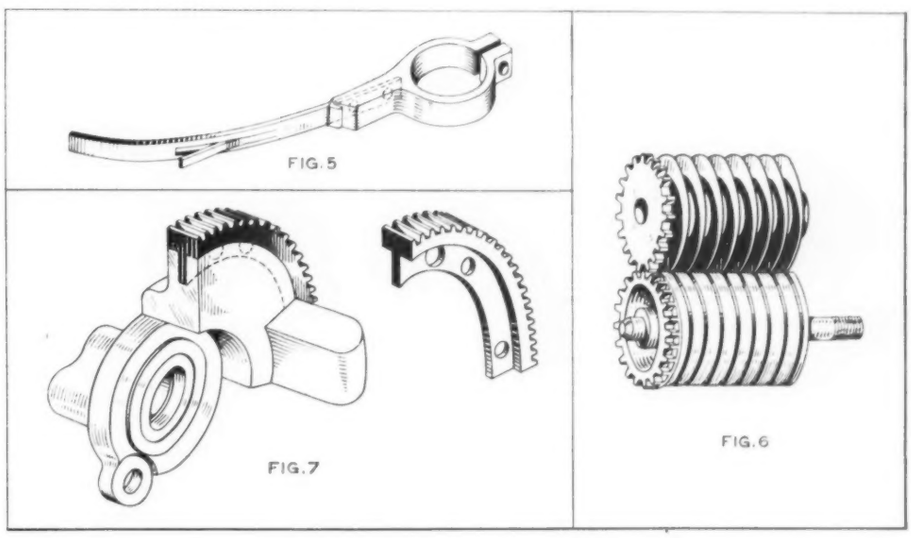


Fig. 5. Flexible Steel Stamped Part Inserted in Zinc-alloy Split-hub Casting. Fig. 6. Eight Circular Steel Cutters for a Vegetable Slicer, Die-cast in Upper Part, Turn in Grooves in the Lower Drum which has a Steel Shaft Insert Cast in Place. The Gears are Cast Integral with the Die-castings. Fig. 7. Die-casting Having a Steel Gear Segment Cast in Place

eccentric itself, integral with an enlarged hub flange and with a web carrying an integral counterweight. A second casting *B* forms the complete connecting-rod, the large end of which is recessed to receive a ball bearing of about 2 inches outside diameter. The third die-casting *C* is a flanged hub pressed on the shaft.

The face of the flange fits closely against the end of the eccentric boss and the end of the connecting-rod bearing race. This prevents the bearing from moving axially. The two ball bearings in which the steel shaft turns are slipped over it and rest in the die-cast case carrying the assembly. The hub of casting *C* and a concentric hub or boss on casting *A* space the assembly and prevent endwise motion. At its uppermost end, the connecting-rod is tapped to receive a screw which attaches the flexible diaphragm to the rod. This assembly, requiring very little machining, is obviously far less expensive than one built up from forged or sand-cast parts, but is sufficiently strong for the loads imposed.

Assembling Parts within a Die-Casting

Fig. 9 shows an unusual assembly made possible by the use of the die-casting process. Here the main assembly of a major machine element is contained within a die-cast part. The assembly shown is that of the field frame of a magneto type lighting generator for a bicycle. In this case, the inserts include (1) an Alnico disk, previously cast in star shape and having one face ground flat; (2) four pole pieces of soft steel, cut from a rolled section having a groove in each edge; (3) a steel stud for supporting the complete assembly in a bracket attached to the bicycle frame; and (4) a bronze bushing for the armature shaft.

The die is designed to lock all the parts in the correct position, and, when closed, the zinc alloy is forced into the recesses around the inserts, binding them all into one substantial assembly. The casting forms a housing, and the assembly is virtually completed when it comes from the die. This is a rather remarkable example of the way inserts, each of which is a comparatively simple piece, can be combined into an assembly with unusual economy, and without any fastening means except the cast metal. It may suggest other assemblies which can be made in a similar way.

Since the Alnico disk is a very hard magnetic material which can be machined only by grinding, it would be difficult to fasten the pole pieces to it by any other means as simple and inexpensive as that used in this instance. As the armature is overhung—that is, has no bearing on the end away from the bushing cast as an insert—the shaft is extended in the opposite direction, as is also the housing, and turns in a second bushing at the driven end, a recess for which is provided.

This second bushing could also have been cast in place; but rather than do so, the recess was cored for it. This recess is subsequently reamed and the bushing pressed in place. The core is extended to make contact with the cast-in bushing, and, when withdrawn, it leaves an annular space around the shaft between the two bushings, which space is subsequently filled with wool saturated in oil to feed the two bushings, which are of the oilless or porous bronze type. If both bushings were cast in place, the space between them would be filled with metal and could not be cored out. This example, therefore, illustrates how both cast-in inserts and inserts up in place subsequent to casting can be used advantageously.

Fig. 10 shows a gear-case for a household ma-

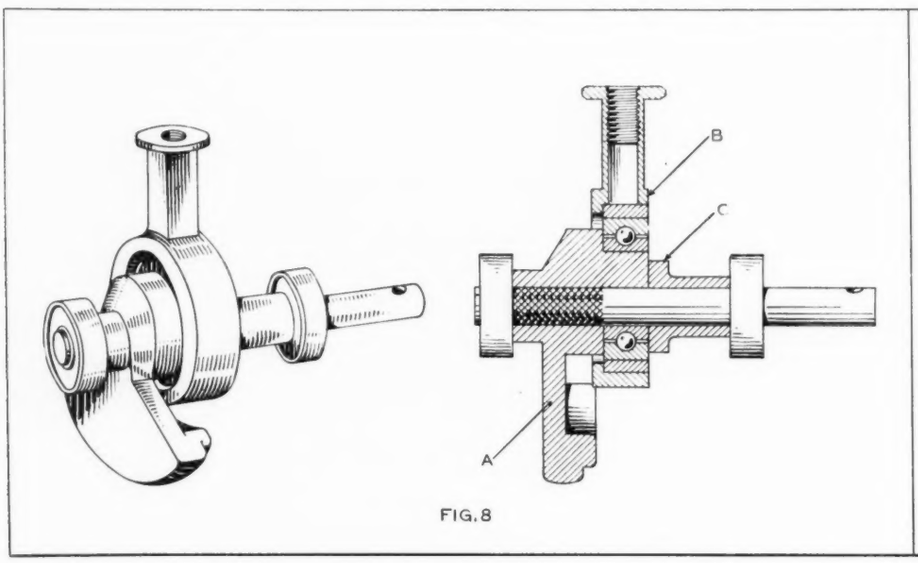


Fig. 8. Three Separate Zinc Alloy Die-castings are Assembled to Form the Eccentric Shaft, Connecting-rod, and Other Parts of a Light Air Compressor. The Steel Shaft is Cast in Place in the Hub, which Has an Eccentric Boss, over which the Ball Bearing of the Connecting-rod Fits

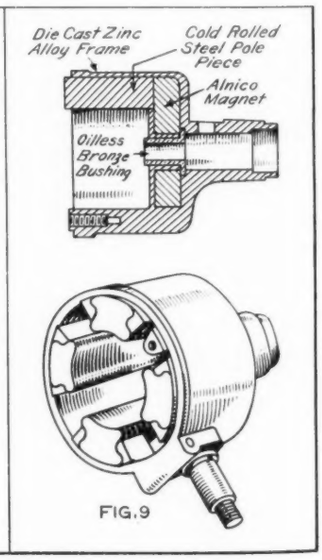


Fig. 9. Seven Inserts United into a Rigid Assembly by a Die-casting Cast around Them

chine produced in large quantities. Here two steel inserts which serve as supports for mounting an electric motor are cast in place in the zinc alloy. Similar supports might be cast integral, without using steel inserts; but if made heavy enough to have a strength equal to that of the steel, they would be too thick to fit a standard motor mounting. They would also add both weight and cost to the casting, which is made from a metal costing more than steel. The inserts, being simple steel punchings, are quite inexpensive. Bronze bushing inserts are also employed in this casting; but as the casting is a large one and requires some light machining operations to hold the required tolerances for center distances, the bushings are inserted after the bearing holes have been reamed.

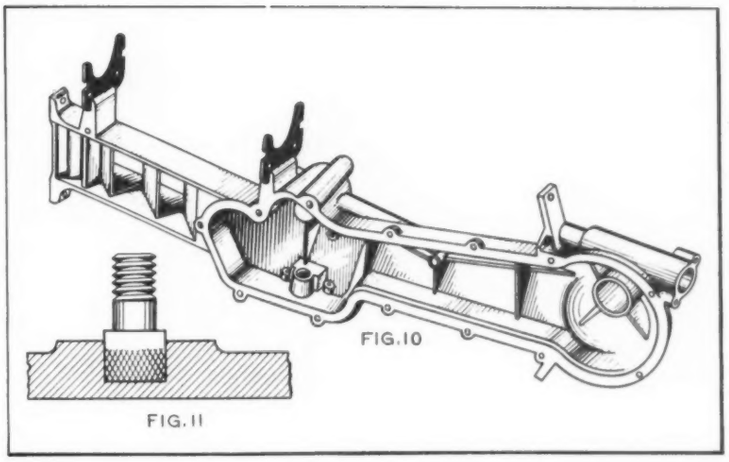


Fig. 10. Gear-case for a Washing Machine Having Stamped Steel Supports (Shown in Black) Cast in Place. Fig. 11. Stud Insert with Head Forming a Step which Prevents Cast Metal from Entering the Thread

Studs of steel and of other metals harder or stronger (or both) than those suitable for die-casting are often used as inserts. They are commonly produced in screw machines, and usually have the heads knurled or shaped in some other way, so as to prevent them from turning or pulling out. The stud is placed in a hole in the die. If, however, it is made so that the threaded portion extends near or into the casting, the cast metal is likely to be forced into the thread beyond the wall of the casting, and may have to be removed by running a die over the stud. This can be avoided, however, as shown in Fig. 11, if the head or a corresponding shoulder is formed to have the face come somewhat above the face of the casting or boss surrounding the stud. The shoulder fits into a recess made in the die; and if the insert is placed firmly against this shoulder, the metal is not likely to flow around the corner formed by the shoulder, provided, of course, that the insert fits the die closely.

In conclusion, mention may be made of inserts that are designed to be turned within the casting, but are cast in place. One form which is quite convenient in light machines or instruments is a bushing such as may be used to take both radial and thrust loads, and which may be made adjustable to take up end play. If the bushing is provided with a fairly coarse thread on its outside diameter and with a hexagonal part or other means, such as a slot, by which it can be turned, and if the thread is covered with a graphite composition before the bushing is cast in place, the metal will not adhere to the bushing and it can be turned in the die-casting.

The feasibility of employing unusual forms of inserts and the relative economy, as well as the advantages or disadvantages of casting the inserts in place, or of applying them after casting, are matters that should be discussed with an experienced die-caster before the design is completed. This may avoid troubles that would not be foreseen or may result in changes that will promote economy. The die-caster usually has more extensive practical experience with inserts than most designers have, and knows what types of construction are most economical. He may sometimes discourage the use of inserts on the ground that they slow up production and thereby increase casting costs; but this may be offset by other advantages that cannot be secured in any other way.

In the case of steel inserts which may rust in service or in storage, plating is sometimes advisable. Inserts to be used in zinc alloy castings, however, should never be plated with cadmium, tin, or lead. The preferable plating is one of a high-purity zinc.

* * *

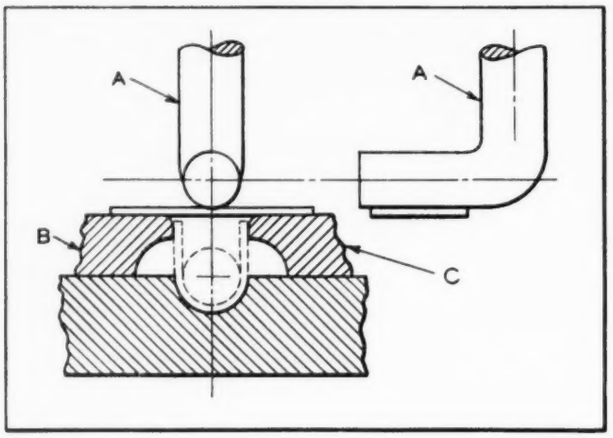
Acetylene Association Holds Meeting in Milwaukee

The International Acetylene Association held its fortieth annual convention at the Schroeder Hotel, Milwaukee, Wis., April 10 to 12. As usual, the meeting was exceptionally well attended, and was characterized by a large number of outstanding papers covering almost every branch of the industry.

The topics of the five main sessions of the meeting were: "General Applications of the Oxy-Acetylene Process"; "Reclamation, Repair, and Maintenance"; "Machine Flame-Cutting"; "Foundry and Heavy Industry Applications of the Oxy-Acetylene Process"; and "Speeding Fabrication and Production." In addition, there were round-table discussions on welding and cutting, and demonstrations of multi-flame pipe welding, flame-descaling, plate-edge preparation, wrinkle bending, flame-cleaning, machine flame-cutting, and heating for bending and straightening. Copies of the papers can be obtained from the International Acetylene Association, 30 E. 42nd St., New York City.

Ideas for the Shop and Drafting-Room

Time- and Labor-Saving Devices and Methods that Have been Found Useful by Men Engaged in Machine Design and Shop Work



Die for Forming Small Cylindrical Tubes from Flat Blanks

Forming Spacing Tubes from Flat Blanks

On page 262 of December MACHINERY is shown a punch and die for curling sheet metal into tubes that makes use of a principle frequently employed in the past. It has been found that, for certain thicknesses and kinds of metal, a better tube can be produced by inserting a mandrel in the die slot. The diameter of the mandrel should be smaller than the width of the slot by an amount equal to twice the thickness of the material to be formed. The punch serves to curl or wrap the sheet material around the mandrel and squeeze it into a true cylindrical form. The mandrel and tube are then removed and the tube is slipped off the mandrel.

The accompanying diagram shows the operating principle of an automatic combination die which was designed for curling heavy sheet-metal blanks into short tubes. After the metal has been formed to the U-shape shown by the dotted lines, on the down stroke of the punch *A*, two forming dies *B* and *C* are forced inward by means of cams to complete the tube.

Oakland, Calif. M. JACKER

Mending Tears in Tracing Paper

Difficulty is sometimes experienced in mending tears or cuts in vellum and other tracing papers, because the transparent gummed tape ordinarily used for such purposes will not adhere properly to the greasy surfaces. However, this tape can be used with good results if the surface of the paper is first rubbed lightly with a fine-grained sandpaper or emery cloth to raise the fibers.

Another and better way is to use LePage's waterproof cement. The torn edges are simply put together and a little cement placed along the break and spread with the tip of the finger. If the cement is applied to both sides, it will be found that the paper will be as good as ever when dry.

West Hartford, Conn. DONALD A. BAKER

Quick-Acting Holding Devices

Two types of quick-acting holding devices are illustrated in Figs. 1 and 2. Fig. 1 shows a simple mounting for holding a gluepot. The mounting rods are shown at *A*. The half-circular lugs *B* are cast integral with the body of the gluepot and support the pot by resting on the rods *A*. Also located on the rods are the sliding collars *C* which carry the set-screws *D*. By tightening the screws, the half-circular lugs serve to hold the gluepot in place. For easy removal, the collars are slid back, so that the set-screws *D* clear the lugs.

Fig. 2 shows a split-hub type of holding device for securing a part to a shaft in such a manner that the part can be readily moved to any position on the shaft. The hub *X* is drilled at *W* and split at *Z*, after which the collar *U* is mounted on the turned portion of the hub. The set-screw *T* serves to clamp the hub in position on the shaft. F. SERVER

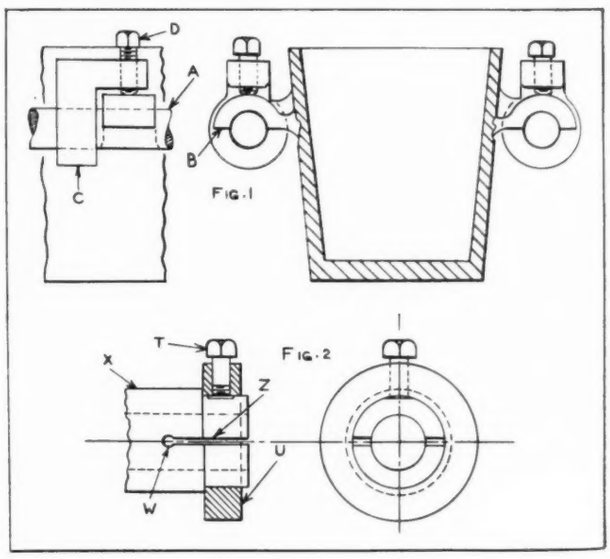
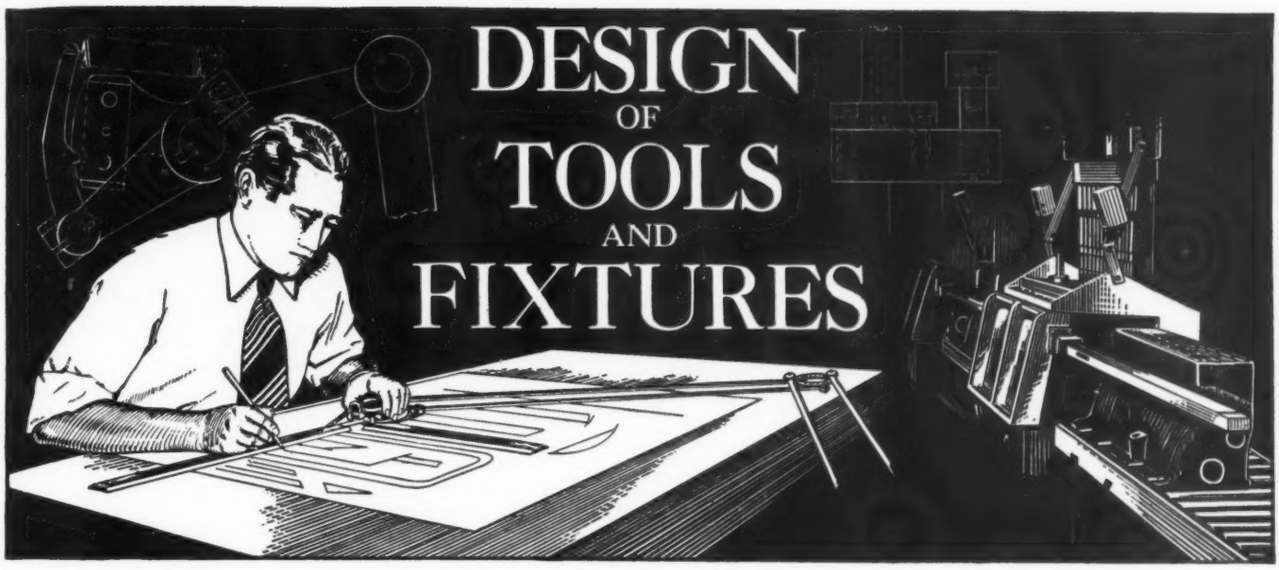


Fig. 1. Simple Arrangement for Holding a Gluepot
Fig. 2. Split-hub Type of Holding Device



Forming Die Operated by Inside and Outside Cams

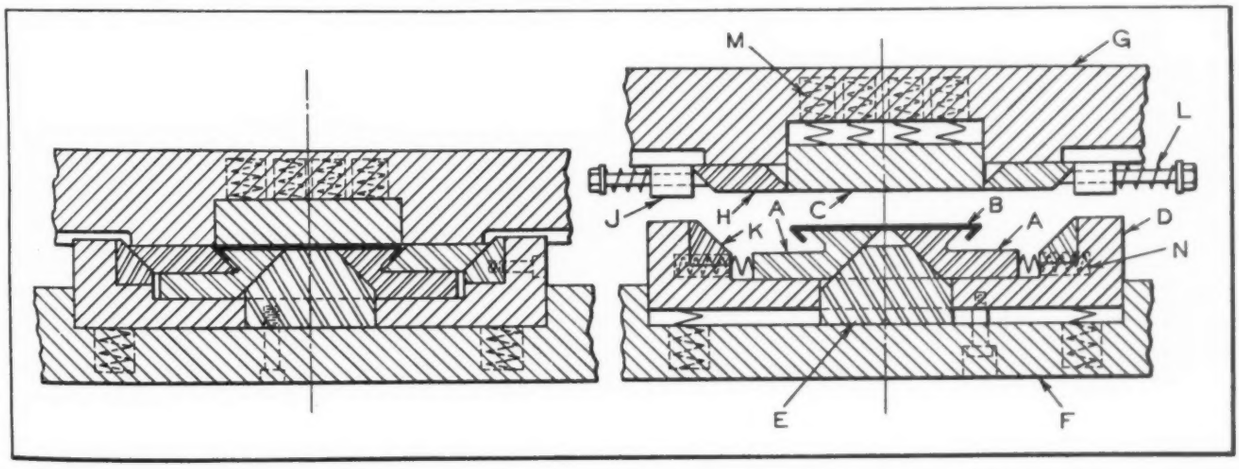
By CHARLES R. CORY, Detroit, Mich.

A flat blank loaded on top of the inside cams *A* of the die here illustrated, when the cams are in the collapsed position indicated in the view to the right, is formed to the shape shown at *B* in one stroke of the press. The gages for locating the blank are not shown. On the down stroke, the strong upper spring pad *C* comes in contact with the blank and pushes down cams *A*, which slide in gibs on the top surface of the weak lower spring pad *D*. As the pads move downward, driver *E* spreads the inside cams until finally the cams and the driver form a continuous flat surface of the same size as the finished part, as indicated by the view at the left, which shows the die in the closed position.

After the lower pad has bottomed on die-shoe *F*, the upper spring pad stops its downward travel, although the rest of the punch-shoe assembly, consisting of punch-shoe *G* and outside cams *H*, continues to travel downward. During this movement, the upper pad springs are compressed. Outside cams *H*, backed up by stop-blocks *J*, flange or form the part around the corners of inside cams *A*. The action of outside cam-drivers *K* causes the outside cams to flange the part to the desired inward-sloping angle, since outside cams *H* travel at an angle equal to the angle of drivers *K* relative to the die-shoe assembly and the part *B* being formed. Outside cams *H* slide in gibs fastened to punch-shoe *G*.

On the up stroke, the strong upper pad springs keep lower pad *D* down until the ascending outside cams *H* have moved outward against stop-blocks *J* under the action of springs *L*. After upper springs *M* have expanded, the lower pad begins to rise and inside cam springs *N* push cams *A* inward to a collapsed position. The finished part with its inward sloping flanges can now be unloaded by the operator.

Flanges can also be formed on the other two sides of the part if they are not required to be formed to an inward-sloping angle. The top sur-



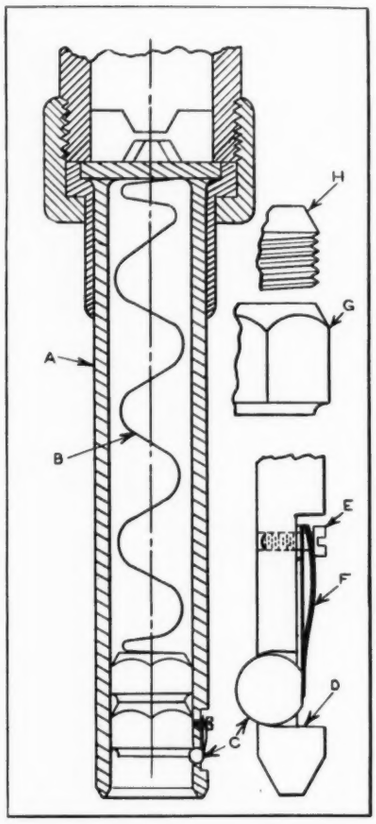
Views Showing Closed and Open Positions for Forming Die Operated by Inside and Outside Cams

face of the part can be formed to a shape other than flat by the action of the upper spring pad, since the inside cam action is such that there are no gaps in the inside holding surface when the inside cams are expanded.

Power-Operated Magazine Socket Wrench for Rapid Assembling

By MAX HAAS, Elmira, N. Y.

In manufacturing automobile clutches, the final inspection operations are performed with the clutches mounted on a fixture similar to the flywheel of a motor. The clutch is fastened in place by assembling and tightening twelve nuts on studs located in the fixture. Considerable time was consumed in assembling the nuts by hand and tightening them with a wrench. Also, in removing the nuts, they were often dropped on the floor and had to be picked up. To eliminate this tedious hand operation and speed up inspection, the magazine socket wrench here illustrated was devised. A portable electric wrench equipped with this magazine socket was suspended over the fixture by means of a counterweighted steel cable.



Power Wrench with Magazine for Twelve Nuts

The body *A* of the magazine wrench, made of chrome-vanadium steel, was broached to accommodate twelve 3/8-inch hexagonal nuts. The top of the wrench body was machined to receive the overload slip clutch of the portable electric wrench. The bottom or open end of the socket is equipped with a retaining device that keeps the nuts from being forced out of this magazine by the light compression spring *B*. This device consists of three 3/32-inch steel balls *C*, placed in holes about 1/4 inch from the mouth of the socket, 120 degrees apart. These holes are not drilled all the way through the wrench body, a lip being left on the inside of the magazine to retain the balls. Holes are drilled and tapped in the milled slots *D* to receive the machine screws *E* that hold the thin double-leaf springs *F*. These springs rest on the flattened portions of steel balls *C*.

The nuts used with this power wrench are made with a large chamfer on top, as indicated at *G*, and have a shoulder machined on the body to fit balls *C*. This allows the retaining balls to hold the nut in place and yet permit it to slide easily from the wrench when it is being assembled on the bolt. The studs on which the nuts are assembled have a large chamfer, as shown at *H*. This allows the nuts to be easily located and started. In operation, the wrench is held down over the first stud until the socket is stopped from turning by the overload slip clutch. The nuts are removed and returned to the magazine by reversing the wrench rotation.

Chuck for Triple Gear

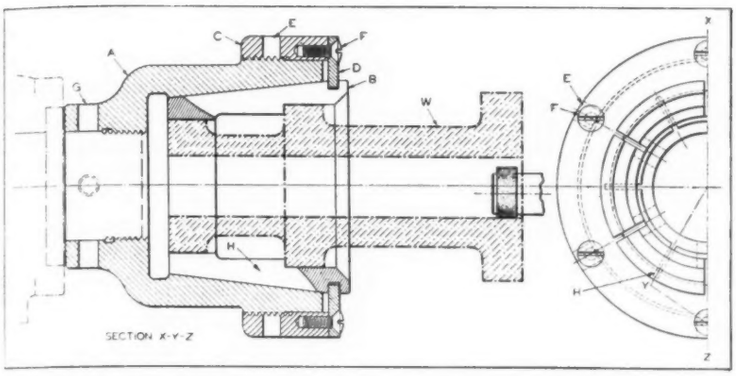
By J. R. WHITTLES, Holden, Mass.

The quick-acting collet shown on the next page is attached to the headstock of an internal grinding machine for holding a triple gear while grinding the hole concentric with the outside diameters of the gears. When grinding gears of this type, it is important that the outside diameters be held to a very close tolerance, because they control the accuracy and concentricity of the pitch lines of the finished gears.

Body *A* of the chuck is threaded to fit the nose of the spindle and is squared from the collet on the headstock spindle. The chuck is made with a bore tapered to give an included angle of 15 degrees to receive the expanding sleeve *B*. The outside of the chuck body is threaded to fit the threads on ring *C*, which moves sleeve *B* in or out through plate *D*. Plate *D* is circular in shape, and is made in two pieces to permit assembling. The two circular plates are fastened to ring *C* with screws *F*.

Expanding sleeve *B* is made from tool steel, hardened, spring-tempered, and ground inside and out. It has twelve slots or saw cuts *H* in it, six cuts being made from each end of the sleeve. The gear to be ground is squared up with the inside shoulder of expanding sleeve *B*, which also acts as a stop for the middle gear when it is being located in the chuck. The inside gear simply lines up the work.

There are six holes *G* on the outside of the chuck body which are used for tightening the chuck on the lathe spindle and for holding the chuck in position for expanding or releasing sleeve *B*. Holes *G* are used for holding the chuck with one hand while using a rod to operate ring *C* with the other hand. On the outside of ring *C* are six holes *E* for use in threading the ring on the body. A set-screw is used for locking the body of the chuck to the headstock spindle. The work is indicated by heavy dot-



Chuck for Holding Triple Gear while Grinding Shaft Hole

and-dash lines, with the grinding wheel shown in position to grind the hole. The operating parts of the chuck are located at the front end which facilitates loading and unloading.

Using Die-Grinder on Lathe Faceplate for Planetary Grinding Job

By H. J. CHAMBERLAND, Springfield, Mass.

The mounting of a die-grinder on the faceplate of a lathe, as shown diagrammatically in the accompanying illustration, provides a planetary grinding set-up which can be employed to advantage for a variety of work that cannot be readily mounted on the faceplate for grinding in the conventional manner. The diagram shows the equipment set up for grinding twin bores in a lot of twelve castings like the one shown at *W*. The work performed on part *W* is similar to that of grinding a cylinder block. The bores are required to have a fine finish and to be in line and spaced accurately within 0.001 inch.

The first step in assembling the equipment for the set-up shown was to provide plate *A* for holding the work shown at *B*. Work *B* is clamped in place by a strap *C* and bolts *D*. The work had been previously planed accurately to a uniform height, making it easy to position it so that the bores could be accurately located vertically by finishing the top surface of plate *A* to the correct height. Plate *A*, to which the work is clamped, was attached to the compound rest of the lathe.

The next step was to devise means for carrying power to the revolving grinder, which is a medium-sized die model from which the handle has been removed. This was accomplished by riveting two copper bands *E* and *F* to a strip of rubber *G* cut from a discarded belt. The assembly was then cemented around the faceplate as shown. The dovetail-slide angle-plate *H*, which was available, was used as a mounting for the grinder. The electric cord *J* was cut off about a foot from the motor, which was readily strapped to the angle-plate as shown. This assembly was securely bolted to the faceplate after positioning the grinder spindle concentric with the lathe spindle. Wires *J* were then soldered to bands *E* and *F*.

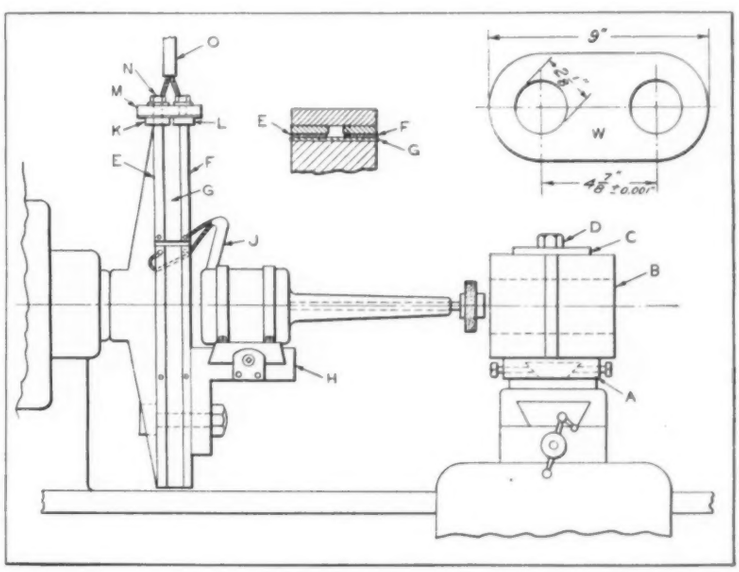
Current was supplied to bands *E* and *F* through contact plates *K* and *L*, which are tapped and fastened to the Bakelite insulating member *M* by means of screws *N*, to which the wires of the feed cord *O* are connected.

Bakelite piece *M* of this assembly was fitted to one end of a strip of washer stock, which was bent and fastened to the rear of the lathe bed in such a position as to keep plates *K* and *L* in contact with bands *E* and *F*. A grinding wheel was used that allowed suitable clearance for the eccentric movement of the wheel. The carriage was operated automatically. By checking the spacing carefully, no trouble was experienced in keeping the work within the required tolerances. The angle-plate, which has a 1-inch bed adjustment, was counterbalanced.

Fixture for Holding Carbide Tools while Brazing

By S. M. WHITE, Chicopee Falls, Mass.

A fixture for holding tool shanks while brazing on a carbide tool bit is here illustrated (see next page). The use of this simple fixture makes it unnecessary for the operator to press down and

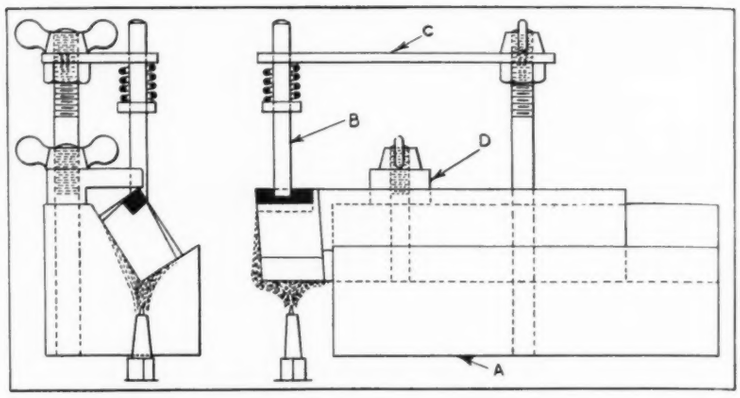


Die-grinder Mounted on Lathe Faceplate for Hole-grinding Job

seat the tip with a rod while the brazing medium cools. Silver solder, which is generally recommended for this application, is very satisfactory for use with this fixture.

The cast-iron base *A* has a 90-degree slot machined in it in such a position that pressure from rod *B* is evenly distributed on the tip. The pressure rod *B* is made from "Nichrome," carbon, or any heat-resisting material, and has a vee in one end to fit the tip. The weight of the tool shank will keep it in position on the base or a light clamp *D* may be used. A light coil spring will furnish sufficient pressure to keep the tip in position while heating and while the tool is cooling enough to set the solder. When the solder has set, the tool can be removed and placed in a slow cooling medium, such as carbon black. The piece of flat stock *C* which supports rod *B* is slotted so it can be moved to any position and locked in place by a thumb-nut and lock-nut. The fixture is so arranged that right- or left-hand tools can be held by swinging *C* to either end of the base.

Tools held in the position shown can be heated without permitting the flame to touch the tip, as the oxy-acetylene flame can be applied to the base and back side of tool so that the tip is heated by conductivity. Tool shanks of various sizes can be brazed by simply varying the length of the pressure rod *B* used to hold the tip in place.



Fixture for Applying Pressure to Carbide Tip while Brazing it to Holder

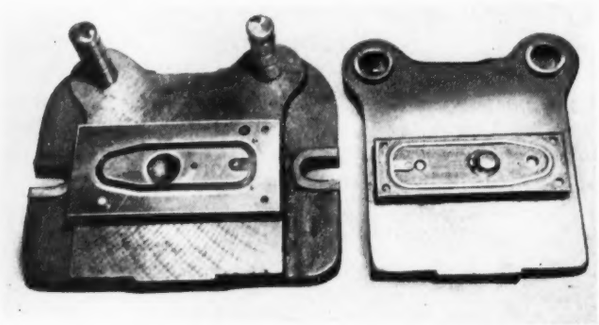


Fig. 1. Die Designed to Emboss Blank A, Fig. 2, as Shown at B

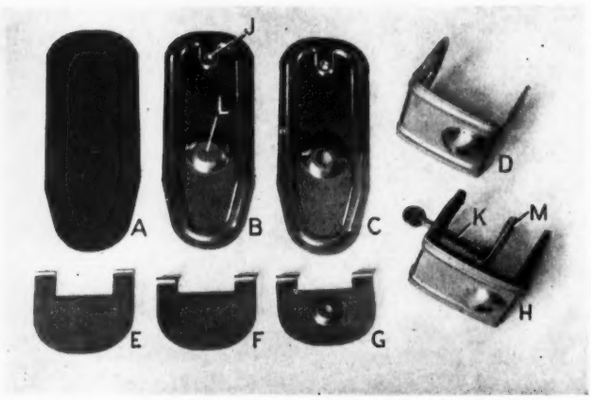


Fig. 2. Consecutive Steps in Production of Clamp H for Spot-light Lamp

Die for Producing Clamp for Spot-Light Lamp

By M. J. GOLDSTEIN, New York City

The dies employed in making the steel shells comprising the body of a bullet-shaped spot-light lamp were described in February MACHINERY, page 112. In Fig. 1 of the present article is shown one of the dies used in making the clamp *H*, Fig. 2, for that lamp.

The clamp for attaching the lamp to the bed frame is made in two parts, and requires seven operations for its production. It is assembled complete before being attached to the lamp. The die shown in Fig. 1 is used for embossing the clamp body, made from blank *A*, Fig. 2. This die embosses the stiffening rib on the blank, as shown at *B*, and at the same time, forms hole *J*, which is later tapped for the 1/4-inch screw *K*. It also forms the angular boss *L*. The nut by means of which the lamp is attached to the clamp fits into the under side of the boss, which is formed to prevent the nut from turning.

The view at *C*, Fig. 2, shows the clamp body before it is bent to the shape indicated at *D*. The views *E*, *F*, and *G* show the evolution of the jaw *M* of the assembled clamp *H*.

* * *

In America, the term "business" does not define merely a commercial technique—it defines the life force of the nation. The business of every American is, directly or indirectly, business. Business—which is to say, the American way of life—has created for the American people the highest mass standard of living of any great people in history.
—*New York World-Telegram*

Questions and Answers

A Department in which the Readers of MACHINERY are Given an Opportunity to Exchange Information on Questions Pertaining to the Machine Industries

Horsepower Capacity of Sloping and Vertical Belts

M. E.—I believe that I am correct is stating that the rules for figuring horsepower found in handbooks and catalogues are always based on the use of horizontal belts—not vertical or sloping belts. What percentage, if any, should one deduct from the horsepower transmitted by a horizontal belt when the belt runs at, say, a 45-degree angle?

Answered by W. F. Schaphorst, Newark, N. J.

To find the capacity of a vertical or inclined drive, the angle of which with the horizontal is greater than 40 degrees, subtract the angle of inclination from 140. The result is the percentage of capacity of the belt as compared with a horizontal belt of the same size. For example, when the angle of inclination is 45 degrees, as in the question above, we have:

$$140 - 45 = 95$$

This indicates that the capacity of a belt at a 45-degree angle is 95 per cent of the capacity of a horizontal belt. In other words, 5 per cent should be deducted from the horsepower given for a horizontal belt.

When this rule is applied to a vertical belt, we have:

$$140 - 90 = 50$$

which indicates that the capacity of the vertical belt is 50 per cent of the power transmitted by a horizontal belt. It may seem that 50 per cent is a rather large deduction, but for year-in and year-out service it is recommended for most drives that are not automatically tensioned.

Alloy Steel for Tractor Shoes

C. A. C.—What composition of cast alloy steel is considered most suitable for tractor shoes?

Answered by Editor, "Nickel Steel Topics," International Nickel Co., Inc., New York City

A steel in fairly wide and successful use for this application has the following composition: Carbon, 0.35 to 0.45 per cent; manganese, 1.00 to 1.25 per cent; nickel, 0.80 to 1.00 per cent.

The castings are first normalized, then reheated and differentially hardened by immersing only the tread section in oil, after which they are drawn to a hardness of 400 Brinell on the wearing surface.

Steels of somewhat higher alloy and carbon content, such as S A E 3145, have been used for tractor shoes, the treatment usually consisting of normalizing and tempering to a hardness of from 275 to 300 Brinell. A better product is produced by oil-quenching, as previously described, but there is some danger of quenching cracks, particularly in cases where the shoes are of complicated design.

What is a Bailment Sales Contract?

M. G.—What is the difference between a bailment and a conditional contract of sale? Does a seller have the same rights in both to repossess the machinery if the purchaser breaks his contract to make payments?

Answered by Leo T. Parker, Attorney-at-Law Cincinnati, Ohio

The term "bailment" means that a purchaser has legal possession of property for a limited time, but that the title to it remains in the original owner, or seller. However, under a conditional contract of sale, although the title to the merchandise may remain in the name of the seller, after the purchaser has performed his obligations, such as paying all installments due, he automatically acquires legal title. But it should be noted that a purchaser does not take legal title unless the contract clearly provides that he shall do so.

In Ignelzi [48 F. (2d) 297], it was shown that a contract for sale of equipment specified that title should remain in the name of the seller, with the understanding that the buyer would purchase other merchandise from the seller at a stipulated price. It was further agreed that a certain percentage of the price of merchandise purchased in the future should be credited to the purchaser, and applied as payment for the equipment. In later litigation, which arose over ownership of the equipment, it was contended that by the terms of this agreement the purchaser actually held title to the equipment from the time it was delivered to him.

However, it is important to note that the higher Court held the transaction to be a bailment and not a conditional contract of sale. Therefore, since the transaction was a bailment, the seller was the legal owner of the equipment.

The technicalities involved in term-sale contracts call for great caution on the part of both seller and buyer. When such contracts are drawn up, legal advice is the safest course.

Universal Stock Support for Punch Presses

By A. F. MURRAY
Manufacturing Engineer
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Fig. 1. Corner of the Press Department, Showing Machines Equipped with Universal Stock Supports

SOME time ago, the Westinghouse Electric & Mfg. Co. installed a number of punch presses of from 10 to 60 tons capacity to meet the requirements of a new manufacturing lay-out. Both inclinable presses and inverted type dieing machines were included in the group. One of the problems met with in the installation of these machines was the provision of strip stock supports that could be applied to any of the machines and be quickly adjusted to suit presses that are of different heights and inclined at various angles.

The stand finally built for this purpose, which proved quite successful and has since been applied in other departments, is shown in Figs. 1 and 3. This stand can be easily moved from one press to another when changing from blanking to forming operations, and can be readily set aside when space is required at the side of the press for forming operations.

Fig. 1 shows a corner of the press department in which the stands were first installed. In the foreground, are two 25-ton dieing machines, each with one of these stands in a horizontal position. In back of these machines (near the center of the illustration) may be seen a 30-ton inclinable press which is equipped with one of the stands adjusted to an inclined position.

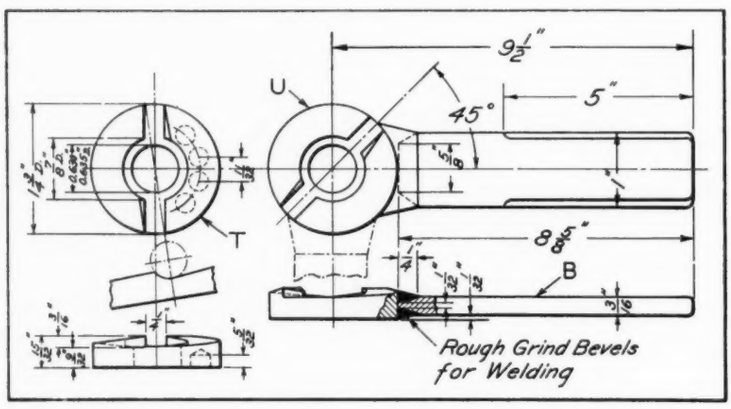


Fig. 2. Quick-acting Clamping Cams Used on Stock Support

The stand is used either with a plain wooden slide board, 1 inch thick, having an edge strip nailed on, or with a sheet-steel slide plate made by bending up one edge of a piece of 1/8-inch cold-rolled sheet steel in a press brake. The machine shown in the foreground of Fig. 1 is equipped with a sheet-steel slide of this type. The design of the support stand is shown in Fig. 3. It is fabricated by arc welding, and is so designed that it can be adjusted without the use of wrenches by means of two quick-acting cam clamping levers *A* and *B*.

The stock support consists of four main parts—the base assembly, supporting shaft, adjustable bracket, and cam clamping levers. The base assembly consists of baseplate *C*, column *D*, clamping block *E*, clamping stud *F*, set-screw *G*, and lock-nut *H*. The baseplate is 20 inches in diameter, and was cut from 1-inch boiler plate with an oxy-acetylene torch. Three holes *I* were drilled on a 16-inch bolt circle for fastening the stand to the floor; in practice, however, bolts have never been used, as the unit shows no tendency to slide or become upset. Column *D* is a piece of 2-inch extra heavy pipe, 19 inches long, arc-welded to base *C* with a fillet weld around the entire circumference and a fillet weld around one-half of the circumference of clamping block *E*, the other half being left free to permit the clamping mechanism to function properly.

Clamping block *E* is simply a piece of hot-rolled bar stock, 2 1/2 inches square

by 4 1/4 inches long. It is drilled and reamed to a diameter of 1 1/4 inches, with a limit of plus 0.005 inch, for a free fit on shaft *J*. A 3/16-inch slot is cut in the block, and cross-holes are drilled for a 1/2- by 4 1/2-inch clamping stud *F* and a 1/2- by 1 1/8-inch set-screw *G* and lock-nut *H*. The block is not recessed into the pipe before welding; stud *F* is tack-welded after it is screwed in place.

Supporting shaft *J* is made from a piece of cold-rolled steel 27 inches long with a small piece of 3/8-inch steel plate *K*, 2 inches square, arc-welded in place as shown. After welding the plate to the shaft, a flat *L* is milled the full length of shaft *J* parallel with the face of plate *K* and 17/32 inch from the center line. Another flat *M*, 5 1/2 inches long, is milled on the upper end at a distance of 5/16 inch from the center line. Set-screw *G* in the base is adjusted to bear against the long flat surface of the shaft to prevent the latter member from turning in any position to which it may be elevated. The shorter flat provides a bearing for clamping the upper bracket or support rail *N* in place. Two 41/64-inch clearance holes for 5/8-inch bolts are drilled 3 1/4 inches apart for swiveling and clamping the support bracket. A 5/8- by 2 1/2-inch hexagonal-head bolt *O* is inserted in the hole at the front end of shaft *J*. The hexagonal head of this bolt is then arc-welded to the shaft.

The adjustable bracket *N* is made from a piece of 4- by 6- by 1/2-inch angle-iron, 12 inches in length, with a stop-plate *P*, made from a piece of hot-rolled steel plate, welded to one end. A 41/64-inch pivot hole is drilled through the 6-inch leg of bracket *N* for bolt *O*. A 3/4-inch wide curved slot *S* centered from the pivot hole is machined at a radius of 3 1/4 inches for a total arc of 60 degrees, 45 degrees of which extends toward the short end of the bracket from the vertical or central position. One leg of the bracket is then cut away for clearance. The special 5/8-inch T-head bolt *Q* has a square head milled to fit freely in the curved slot in bracket *N*.

Bracket *N* is placed over bolt *O*, which passes through a hole in shaft *J*. Lock-nuts *R* are adjusted so that the bracket will move freely, but not loosely, about bolt *O* as a pivot. T-bolt *Q* is inserted after its corners have been filed to permit it to slide freely in the curved slot *S*. The round half of clamping cam *T*, Fig. 3, is assembled on stud *Q* and locked to resist turning by a 1/4-inch drill-rod dowel-pin set in a hole drilled in the face of plate *K*. The handle half of cam *U*, Fig. 2, which is welded to lever *B*, is next assembled and secured in place by a split lock-nut *V*, Fig. 3, and a plain washer. The lock-nut is adjusted so that the shoulder of the cam spirals at from 1/8 to 1/4 inch clearance when free.

Lever *A* and its cam, together with the mating round cam and split nut, are assembled on stud *F* in the same way as the corresponding members were assembled on stud *Q*. Shaft *J* and bracket *N* are then dropped into place in the base column *D*. To avoid interference between cam handles *A* and *B*, these members are placed on opposite sides of the stand, and, therefore, one has a right-hand spiral, while the other has a left-hand spiral cam.

The clamping cams shown in Fig. 2 are standard details used for many purposes in jig and fixture design. They are made from cold-rolled steel with a double 3/8-inch spiral lead which allows an adjustment of nearly 3/16 inch. One half of the cam is drilled with a number of holes for a locking dowel, and the other half has a handle of 3/16- by 1-inch hot-rolled steel bar stock, 8 5/8 inches long.

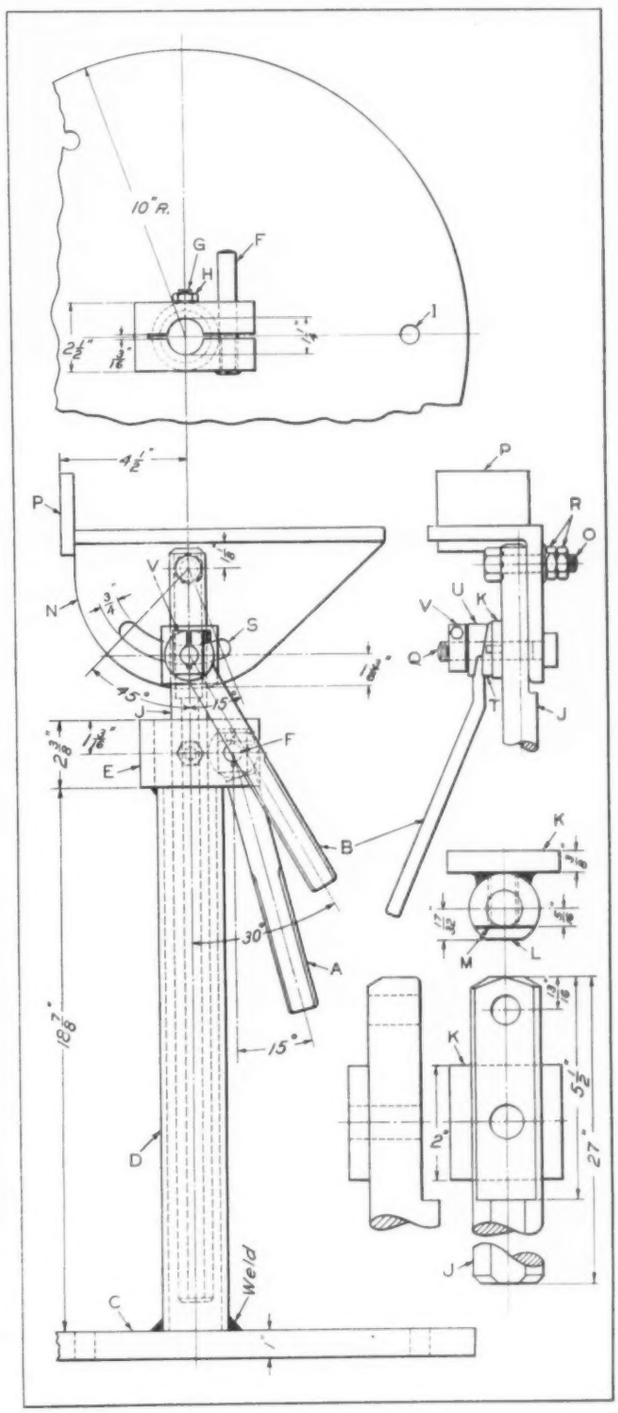


Fig. 3. Stock Support of Design Employed on Machines Shown in Fig. 1

What Price Security?

"The ideal of security seems to be, at the moment, a strikingly appealing one," said Dr. Harvey N. Davis, president of Stevens Institute of Technology, in a recent address. "In a war-wracked world this country passionately desires security from international troubles, apparently even to the extent of being willing to abandon all expectation of actively helping to make the world as a whole a decent place to live in. In our internal economy we seem to be far more concerned about unemployment insurance than about employment itself. Thirty dollars every Thursday is far from a dead issue; and the CCC and the WPA are going strong, while industry digs in and lives only from hand to mouth.

"All this is characteristic of national maturity, not to say senescence. Hitherto it has been chiefly among the older peoples of the world, such as the Chinese and the French, that personal and family security have become the fundamental basis of the philosophy of life of the common people. Is it possible that we have reached that stage in our evolution as a nation? Have we passed the period in our national development when every mother believes that her new-born son may some day, perhaps, be the President of the United States; when every skilled mechanic in a machine shop dreams of becoming a Warner, a Swasey, a Hartness, or a Brashear; and when out of humble bicycle shops in Detroit and Dayton can come ideas destined to revolutionize the transportation and the whole mode of living and thinking of the nation?

"I cannot believe that the United States has yet crystallized into a nation of security seekers. I cannot believe that our individual initiative and courageous adventurous optimism are doomed. I still feel that the best possible sort of security is the dynamic security of vigorous activity, rather than the static security of individual and national hibernation."

* * *

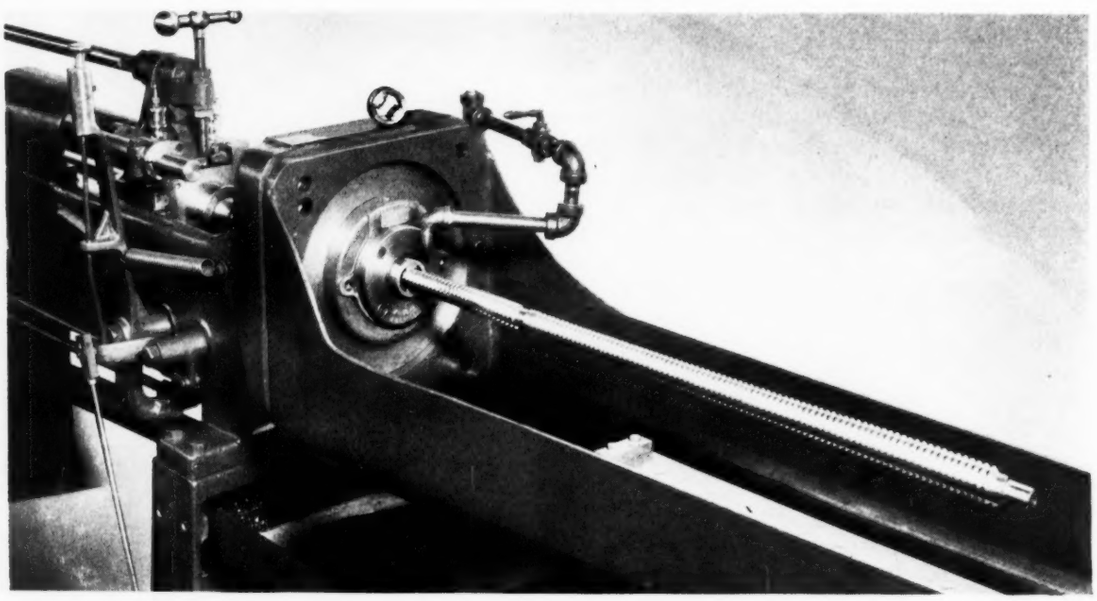
Combined Helical and Straight Broaching of Diesel-Engine Parts

The Oilgear horizontal broaching machine here illustrated was installed in a Russian plant for performing a combined helical and straight broaching operation on Diesel-engine parts. The operation consists of broaching four 7-degree helical grooves across the width of the part, which is approximately 3/4 inch, and also of broaching two half-moon surfaces through the part. The half-moon surfaces and the helical grooves are broached from a 0.945-inch hole previously machined in the bronze die-casting, the diameter across the finished half-moon surfaces being approximately 1 9/16 inches. The broach requires a stroke of 48 inches.

The short section of the broach closest to the faceplate cuts the four helical grooves as the part swivels on the ball-bearing faceplate. After the broaching of the helical grooves has been completed, a series of 90-degree V-teeth on the broach hold the work-piece stationary while the half-moon straight surfaces are broached in a definite relation to the helical grooves.

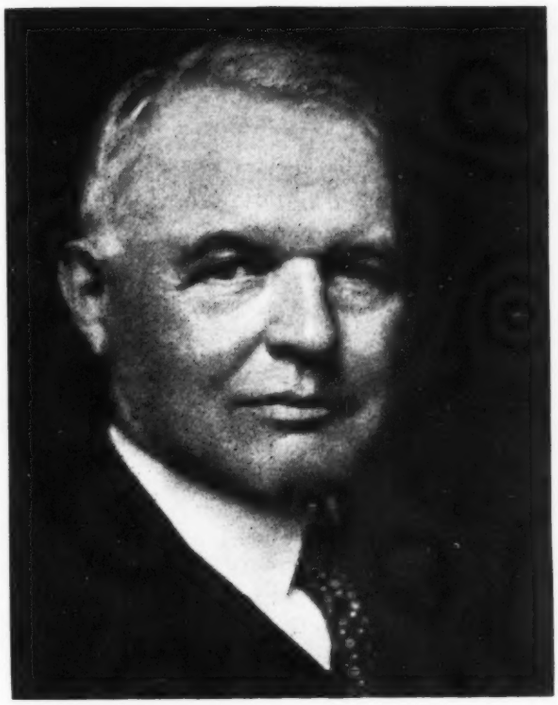
* * *

During recent months, the railroads have handled the most rapid increase in freight traffic on record without congestion or serious car shortage. Recent car loadings are the highest since 1930.



Broaching Equipment Used in a Russian Plant for Broaching Helical Grooves and Straight Surfaces in the Same Operation

The Gleason Works Celebrates Seventy-Fifth Anniversary



James E. Gleason, President and General Manager of the Gleason Works

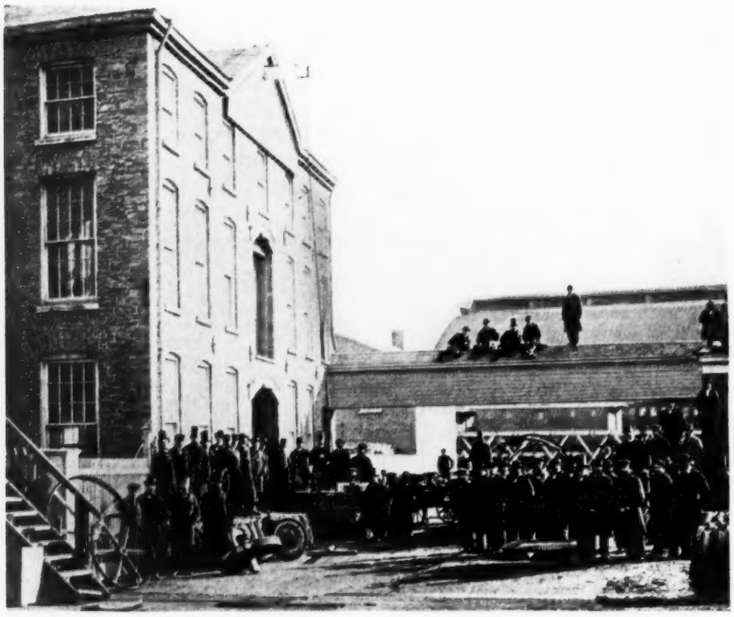
William Gleason, Founder of the Gleason Works in Rochester, N. Y.

ON April 6, several hundred industrial and business leaders from all over the country, and even from abroad, gathered in Rochester, N. Y., to celebrate the seventy-fifth anniversary of the founding of the Gleason Works. The event was a memorable one, marking, as it did, an important milestone in the growth and accomplishments of a machine tool building concern known throughout the entire world.

During the evening, the Gleason plant was open to the company's employes and their families and friends. Some 7500 people took this opportunity to inspect the works. The climax of the evening came when the employes presented James E. Gleason with a huge silver cup, the cover of which consisted of a miniature spiral bevel gear. On the cup was inscribed "Presented to James E. Gleason by his employes with their love and esteem to commemorate the Seventy-fifth Anniversary of the Gleason Works." A handsomely bound book containing a complete list of the employes accompanied the cup.

The Gleason Works was founded by William Gleason in 1865, just at the close of the Civil War. Mr. Gleason was born in 1836, and obtained his training as a mechanic in Rochester and in Hartford, Conn. The original factory was established at Brown's Race on the banks of the Genesee River, where the lower falls would supply the power to run the plant. All the designing, as well as the direction of the shop, was handled by Mr. Gleason himself. The first payrolls carried the names of less than fifty employes. The working hours per week were the standard of those days—sixty-six.

At first, the company manufactured a general line of machine tools, especially engine lathes and planers; but in 1874, Mr. Gleason developed a machine for cutting the teeth of straight bevel gears. This machine, patented in 1876, was the first commercially successful machine for cutting such gear teeth. It was a bevel gear planer of a form-copying type. The basic principles were so mechanically correct that they are used to this day in the largest sizes of bevel-gear cutting machines built by the Gleason Works. The original machine is still in existence. After over forty years of operation, it was presented to the Ford Museum at Dearborn, Mich. A later machine has been preserved at the Gleason Works. This machine was completed in 1878 and was used in industry for over fifty years before being brought back to Rochester. By the turn of the century, the Gleason Works gave up its



Photograph Taken in 1865 of the First Gleason Plant and Working Force, which Numbered Less than Fifty Men

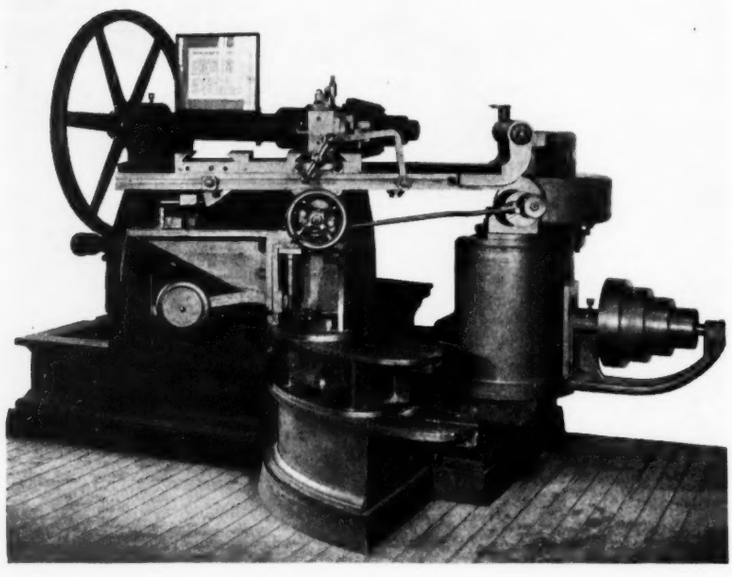
general line of machine tools and devoted all its efforts to the manufacture of machinery for producing bevel gears.

In 1889, fire gutted the three-story structure in which the business was carried on. The drawings, patterns, and most of the machines were destroyed. Although William Gleason was then over fifty, he had repairs well under way and had finished drawings for an entirely new line of machines within three weeks.

By 1905, the company had begun to outgrow its original plant, and over a period of years, a new foundry building and pattern shop, as well as a new machine shop, were erected on the present site, the main machine shop being built in 1911.

During the eighties, William Gleason's daughter Kate and his two sons, James E. and Andrew C., entered the employ of the company. Kate Gleason became associated with the commercial and sales end of the business, while James E. Gleason worked on machine design and production, and Andrew C. Gleason fulfilled the same functions with respect to gears. All three had their engineering training at Cornell University.

In 1905, James E. Gleason developed what is known as the two-tool bevel gear generator, which marked a decided advance in the art of bevel gear cutting. In 1913, he developed a process and tool for cutting the teeth of spiral bevel gears, while Arthur L. Stewart, chief engineer of the company, designed the machine used in the new process. In 1925, the Gleason Works pioneered another revolutionary gear development, when Ernest Wildhaber invented a process and machine for the manufac-



The Original Gleason Bevel Gear Planer Designed and Built by William Gleason in the Year 1875

Entrance to Present Plant of the Gleason Works, where 1600 People are Occupied in Building a World-famous Product

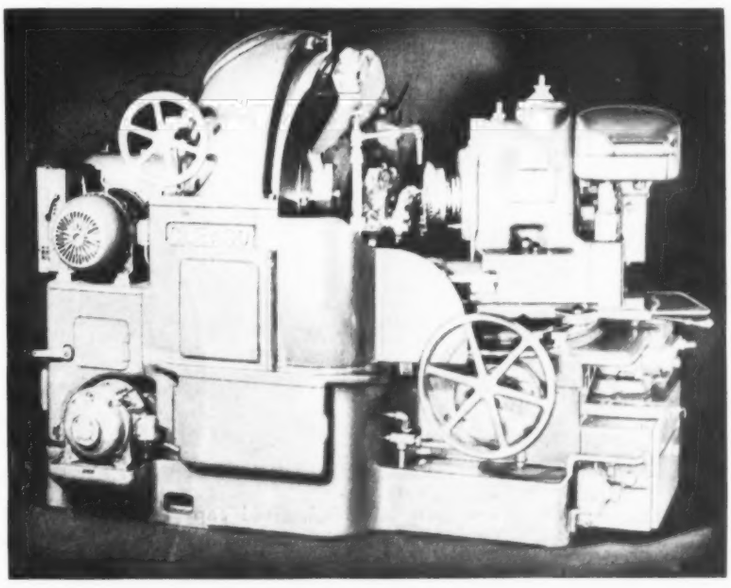
ture of hypoid gears. In 1937, came the Zerol bevel gear, which has already found widespread use in the aircraft industry, as well as in other fields. The company has also developed a complete line of machines for the testing, burnishing, hardening, lapping, and grinding of all types of bevel gears, and for making the tools employed on bevel-gear cutting machines.

The Gleason Works today builds machines for manufacturing gears all the way from those a small fraction of an inch in diameter to those over 40 feet in diameter. All industrially developed countries throughout the world at the present time are fields for Gleason machines.

William Gleason passed away in 1922, and the firm is now headed by his son James E. Gleason. E. Blakeney Gleason, a grandson of the founder, is vice-president and treasurer.

Stabilization of Manufacturing and Employment

In an address before the annual meeting of the Society of Automotive Engineers, W. L. Batt, president of S K F Industries, Inc., Philadelphia, Pa., called attention to the need for as steady employment as possible in the industries throughout the nation. He emphasized the advantages to be gained by every effort in this direction. He especially pointed out that every concern that succeeds in making its own production more regular throughout the year becomes, to that extent, a steadier purchaser and contributes that much to a more even production in some other industry. "One thing," he said, "that all industries can do, is to be more reasonable in their planning and purchasing requirements, as they affect suppliers."



The Gleason No. 16 Hypoid Generator, a Recent Example of Gleason Gear-cutting Machines

Building an Improvised High-Speed Tapper

By W. P. CUMMINS
Time Study and Methods Department
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

MANY moderate-sized shops periodically have fairly large quantities of small parts that require the tapping of one or more holes. The number of pieces or holes to be tapped may not be great enough to justify investment in an expensive automatic tapping machine, and yet may be too large to be tapped economically on a sensitive drill with a tapping head. A small No. 1 drill press can be adapted to strike a happy medium between the tapping head and the automatic tapper. Such an adaptation should not, of course, be considered as a substitute for automatic tappers, which obviously should be used when circumstances justify the cost.

The illustrations show what can be done with an old drill spindle and a few moderately priced parts. As indicated in Fig. 3, a belt is run from the driveshaft to a Type L Boston gear reducer, which is attached to the spindle frame. Attached to the gear reducer is a cam which, through a rack and follower, lowers the spindle; it is raised by a spindle-return spring. A spring clutch of suitable tension is also utilized, so that in case of binding, the tapping operation ceases without causing belt slippage or motor stalling. The head is driven at the proper speed in the usual manner; a reversing unit causes the chuck to turn in the tapping direction when the spindle descends, and to reverse when the spindle rises. Attached to the spindle housing is a lever operated by the rack, which, in turn, operates a plunger (not shown) each time the spindle descends, giving the tap a charge of cutting compound.

Since the completed unit is capable of delivering the necessary tap speed and corresponding reversals in excess of the ability of an operator to feed the parts being tapped, great care should be exercised in designing the jig or fixture for holding the parts to be tapped. In the present case, two suitable hoppers for holding the parts, one on each side of the spindle, are designed with the idea of motion economy, as shown in Figs. 1 and 2. A touch of the finger on either hopper permits a batch of parts to fall within easy reach. The jig is so made that both hands can be used simultaneously for feeding the machine. When the piece has

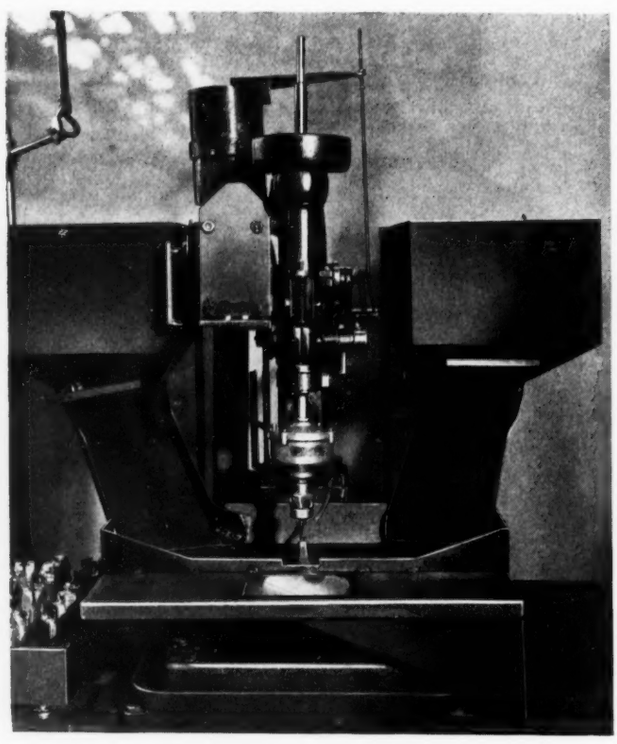
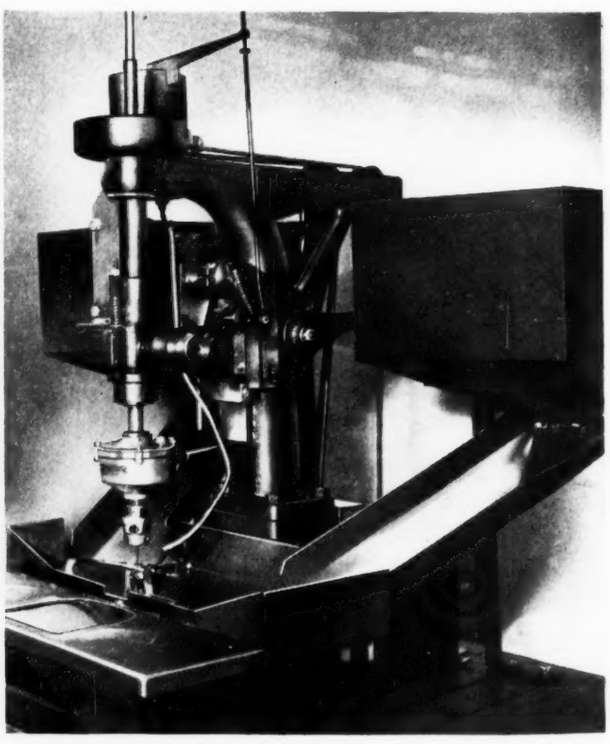


Fig. 1. (Left) Front View of a High-speed Tapper Made from a Small Drill Press. Chutes are Conveniently Located on Each Side to Deliver Work to the Operator's Hands; a Lower Chute Carries the Work to a Container. Fig. 2. (Right) Side View of Improvised High-speed Tapper



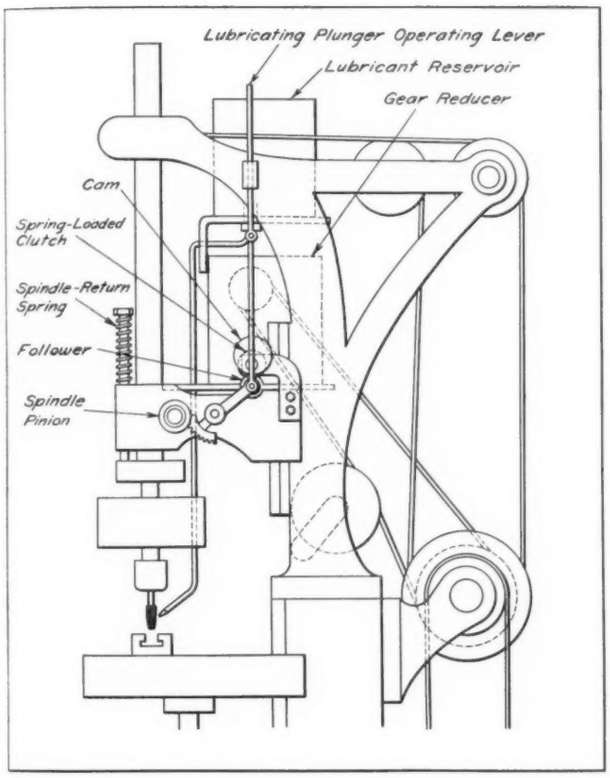


Fig. 3. Diagram of Improvised Automatic Tapping Equipment

been tapped, the operator simply drops it into a chute immediately below, through which it is carried to a container. As the limiting factor is the ability of the operator to feed and remove parts, the jig is designed with this in mind. Almost any shop, large or small, has a spare spindle available, and can, at an outlay of approximately $75, provide itself with an improvised high-speed tapper such as described in the foregoing.

* * *

Production Meeting of Society of Automotive Engineers

The annual National Production Meeting of the Society of Automotive Engineers will be held at the Hotel Bond, Hartford, Conn., Tuesday and Wednesday, May 7 and 8. Several papers will be presented at this meeting dealing with current problems of the automotive and aircraft industries. Macy O. Teetor, of the Perfect Circle Co., will present a paper on "Background for New Tendencies in the Finish of Piston-Rings and Cylinders;" Kirke W. Connor, of the Micromatic Hone Corporation, will speak on "Co-directional Finish on Cylinder Bores;" F. L. Hemingway, of the Foster Machine Co., will deal with "New Method of Testing and Grading Fine Abrasives;" while J. Carlton Ward, Jr., of the Pratt & Whitney Aircraft, Division of United Aircraft Corporation, will speak on "Special Problems in the Production of Aircraft Engines."

At the annual dinner, to be held Tuesday evening, Ralph E. Flanders, president of the Jones & Lamson Machine Co., will speak on "Industry and the Job Problem." During the meeting, opportunity will be afforded for an inspection trip through the new plant of the Pratt & Whitney Division, Niles-Bement-Pond Co., which was placed in operation only a few months ago.

* * *

Automatic Indexing and Unloading Fixture for Gear Broaching

Manual handling is reduced to a minimum by a fixture used for a finish-broaching operation on gear bores, as shown in the accompanying illustration. This equipment is employed in a leading automobile plant. The gears are merely dropped into pot chucks on an indexing table. The broaching machine, built by the Colonial Broach Co., Detroit, Mich., is automatic in operation.

The cycle is as follows: The ram carries the broach through the hole and returns the broach to the top of the stroke. The table is then indexed one-sixth of a turn by a hydraulically operated pawl and ratchet mechanism, and the broach finishes another gear. The finished parts drop out on the far side of the machine.

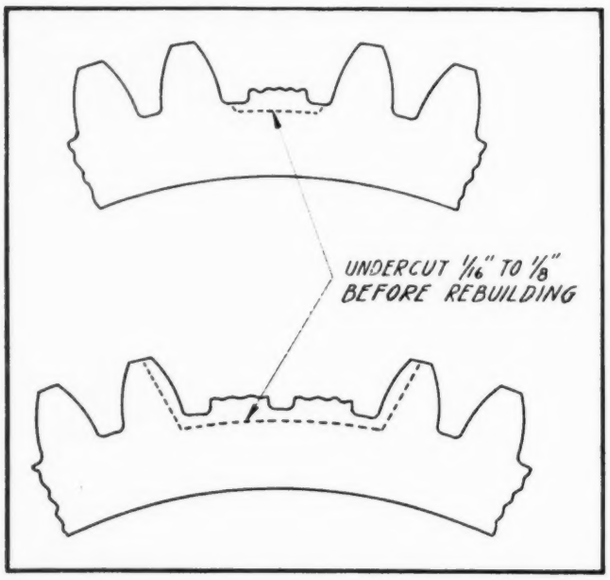
The production is at the rate of 450 pieces per hour. All that the operator is required to do is to drop the gears into the pot chucks. The latter are so designed that they can be removed and other sizes of chucks installed in a few minutes.

Colonial Open-side Utility Broaching Machine with an Automatic Indexing and Unloading Fixture for Holding Gears while the Bore is being Finish-broached

Building up Broken Gear Teeth by Bronze-Welding

When broken gear teeth are to be replaced by building up with bronze, two improvements in the customary procedure, recently outlined in *Oxy-Acetylene Tips*, tend to substantially increase the strength of the repaired gear and to facilitate subsequent machining.

In the case of a single broken tooth, as shown in the upper view of the accompanying illustration, the remainder of the old tooth is entirely removed by grinding, chipping, or machining, and the gear rim is under-cut from 1/16 to 1/8 inch, as indicated by the dotted line. Rim and tooth are then both built up by bronze-welding in the usual manner. In comparison with the customary method of welding bronze directly to the dressed stub, this procedure provides almost double the area of contact between the weld and the base metal, resulting in a considerable increase in the strength of the bond.



Preparing Gears for the Rebuilding of Broken Teeth by Bronze-welding

If two or more adjacent teeth are to be replaced, as shown in the lower view of the illustration, the same procedure is followed, but in addition to under-cutting the gear rim, the facing surfaces of the two sound teeth at each end of the damaged area are under-cut and built up. The bronze inlays on these two sound teeth permit the milling cutter to work on bronze on both sides, which eliminates chatter from the cutter striking against an adjacent cast-iron tooth.

* * *

Steel springs in clocks were first used, according to *The Inventor*, by Peter Henlein in about the year 1490.

Tax and Labor Policies Attract Industries to Massachusetts

In an advertisement in which the Massachusetts Development and Industrial Commission invites business men to locate their manufacturing establishments in Massachusetts, it is pointed out that Massachusetts leads all other major industrial states in the small amount of time lost per employe due to strikes. In these times, it is an encouraging sign to have such a tribute to labor paid by business leaders. John F. Tinsley, president of the Associated Industries of Massachusetts, in the advertisement referred to is quoted as follows: "The skill and cooperative attitude of Massachusetts workers are outstanding factors in the success of Massachusetts industry."

Perhaps, in their own interest, it would be wise for labor leaders in other states to so conduct their activities that manufacturers would not feel inclined to leave their states for one where labor, industry, and local governments cooperate to create the best industrial conditions for everybody.

State and local governments in other parts of the country also should contemplate the fact that taxes in Massachusetts (state and local) on manufacturing corporations average 53 per cent below the average of eight other chief eastern and midwestern industrial states. The per capita debt of the state of Massachusetts—on which, to a considerable extent, future taxes depend—is 28 per cent below the average for the United States.

How much such conditions mean to industry is indicated by the fact that, according to the latest published census, Massachusetts has attracted more new firms than any other state east of the Rockies. There is a lesson here for the public administrators, state and local, elsewhere. Taxation methods can make or break industry. The Federal Government and many state governments have acted, of late, as if they wanted to drive industry out of business.

* * *

Simplified Practice for Files and Rasps

According to the National Bureau of Standards, Washington, D. C., the current revision of Simplified Practice Recommendation R6 on Files and Rasps has obtained the required acceptance by industry and became effective April 1. The revised recommendation will be identified as R6-40. The simplification of files and rasps was first undertaken by the industry in cooperation with the War Industries Board in 1918. At that time, the number of varieties was reduced from 1351 to 619. In 1923, there was a further reduction to 496; the current revision brings the number of stock varieties down to 377. Copies of this Simplified Practice Recommendation can be obtained, without charge, from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

New Treatise on Machine Shop Training

MACHINE SHOP TRAINING COURSE. By Franklin D. Jones. Two volumes, 6 by 9 inches. Volume 1, 474 pages, 221 illustrations; Volume 2, 552 pages, 209 illustrations. Published by THE INDUSTRIAL PRESS, 148 Lafayette St., New York City. Price, complete two-volume course, $6; Volume 1 or Volume 2, if purchased separately, $4.

The MACHINE SHOP TRAINING COURSE is a treatise covering both elementary and advanced machine shop practice. It is especially adapted for shop courses, self-instruction, and technical or trade school use. Volumes 1 and 2 may be used independently, each covering about half of the subjects dealt with in the complete two-volume treatise.

The first volume begins with fundamental principles underlying all metal-cutting operations, and continues with various branches of lathe work, including single-point tool forms and tool grinding; speeds and feeds; cooling and lubricating fluids; and different screw thread standards, with a complete course on screw-thread cutting. Then follow the general application of turret lathes and automatic machines belonging to the lathe family; drilling, reaming, and boring, including precision jig boring; drill grinding; the use of tolerances and allowances in interchangeable manufacture; and, finally, the various types of measuring and gaging tools, with typical applications.

The second volume deals with such subjects as tapping, thread cutting with dies, thread milling, thread grinding, and thread rolling; planing practice; milling, including the milling of irregular contours by reproducing the shape of a model; different systems of indexing; gear-cutting on milling machines; gear-cutting by generating methods, featuring the basic principles; external and internal grinding; lapping, broaching, chipping, filing, and scraping; tool steels and other metal-cutting materials; and the heat-treatment of tool steels.

The complete treatise contains 1026 pages. Questions have been used throughout instead of ordinary sub-heads because they have greater interest-stimulating value and are useful in connection with examinations. These questions are followed by complete answers averaging about one page in length, and all matter is arranged in natural, logical order. Definitions of 330 shop terms in general use occupy 48 pages at the end of Volume 2, many terms used in the treatise and others likely to be encountered in mechanical work being defined briefly.

The MACHINE SHOP TRAINING COURSE not only explains *how*, but gives the reasons *why*. For example, the four sections or chapters on the use of measuring instruments and gages are preceded by two sections explaining why the degree of accuracy is controlled in interchangeable manufacture, and why different classes of fits are employed and have, to some extent, been standardized. This general method of treatment is followed throughout.

The treatise not only deals with all standard types of machine tools and illustrates their use by typical applications, but it includes numerous shop problems with complete solutions, and a lot of information on many closely allied subjects. For instance, there is considerable information and tabulated data relating to approved standards—like standard fits for screw threads, standard fits for cylindrical parts, standard thread forms, American standard gear-tooth forms, and similar matter which has been incorporated wherever it has a direct bearing on machine shop practice. Even the sections on actual shop practice deal, as far as possible, with whatever equipment and methods have been standardized by common and approved usage in modern machine-building plants.

The information on the thousand-and-one details of machine shop practice is supplemented, wherever necessary, with terse explanations of whatever mechanical principles may be directly allied to the subject. The student thus acquires a broad understanding of the basic principles, as well as the details relating to machine-building processes. This training course is not only for the student and shop man, but also for machine designers who recognize the importance of designing on paper to suit available production methods.

* * *

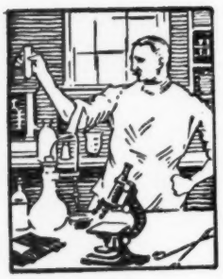
New Industrial Film on Steel Making

The United States Steel Corporation has produced a new motion picture film which tells the story of steel, from the time the ore is mined until the finished product leaves the mills. The film covers seven reels and is available in either the 16- or 35-millimeter size. Each of the seven reels is complete in itself and can be shown separately, although the use of the first two reels describing basic operations is recommended in combination with any of the other reels. Technical societies, colleges, schools, and civic and business organizations can obtain any of these films free of charge by application to the company offices in Pittsburgh, Chicago, New York, Birmingham, Cleveland, and San Francisco. Other films obtainable from the company are entitled "Bridging San Francisco Bay;" "U.S.S. Cor-Ten;" and "Steel — Man's Servant."

* * *

According to the American Gear Manufacturers Association, 602 Shields Bldg., Wilkinsburg, Pa., the sales of gears during March were 9.6 per cent above those for March, 1939.

MATERIALS OF INDUSTRY



THE PROPERTIES AND NEW APPLICATIONS OF MATERIALS USED IN THE MECHANICAL INDUSTRIES

Dies of Alloy Iron Form Airplane Parts

Die-blocks made from an electric-furnace iron are being used for forming airplane parts by Noorduyn Aircraft, Ltd., St. Laurent, Quebec, Canada, according to the *Nickel Cast Iron News*, published by the International Nickel Co., Inc., New York City. The composition of the iron used for these die-blocks is as follows: Total carbon, 2.95 per cent; silicon, 1.20 per cent; manganese, 1.10 per cent; chromium, 0.25 per cent; and nickel, 1.70 per cent. This die iron has a tensile strength exceeding 50,000 pounds per square inch and a hardness of about 272 Brinell.

The excellent grain, surface finish, and wear-resisting properties of this material, coupled with good machinability at high hardness levels, make this iron especially suitable for the service mentioned. Another important advantage is that the dies can be cast close to the final size and shape, thereby greatly reducing the machining costs involved in the production of steel dies. 201

Silver-Ply Stainless-Clad Sheets for Various Applications

Stainless-clad steel sheets and plates, known as Silver-Ply, which combine the corrosion resistance of stainless steel with many of the desirable properties of mild steel have been placed on the market by the Jessop Steel Co., 605 Green St., Washington, Pa. These sheets and plates are suitable for use in the manufacture of cooking vessels, storage tanks, and other equipment employed in the processing and handling of varnish, chemicals, soaps, oil and gas, textiles, paper, pharmaceuticals, and food. They are also adapted for use in marine equipment, sewage disposal plants, etc., and for other applications where corrosion and erosion are problems.

The Silver-Ply sheets can be bent, spun into deep heads, deep-drawn, drilled, and otherwise worked with greater ease than solid stainless steel, and the heat conductivity is better. The usual sheets consist of 20 per cent stainless steel and the remainder mild steel, ordinarily of flange quality. However, plates and sheets can be supplied with the stainless steel ranging from 3 to 50 per cent of the total thickness. The strength of the bond is such that a strip of Silver-Ply can be twisted into a spiral shape without the metals of which it is composed becoming separated. 202

Certified Alloy Cast-Iron Gears Now Available

Certification of nickel - chromium - molybdenum cast-iron gears is now being offered by the Braun Gear Corporation, Brooklyn, N. Y. Each gear carries a label which certifies that the heat from which it was cast has been tested and that its tensile strength is not less than 50,000 pounds per square inch. An identifying number and the hardness on both the Rockwell and Brinell scales are also shown.

It is claimed that the uniform microstructure of the nickel-alloy iron provides improved wear-resisting properties, while the assured high strength permits increased tooth loading with equal or better factors of safety under abnormal service. Reductions in size and weight of gear assemblies may thereby be accomplished. 203

"Nonslip" Pulley Covering which Prevents Belt Slippage

A material developed many years ago and applied to the face of pulleys to prevent belt slippage is now being manufactured for the market by the Nonslip Pulley Covering Co., 777 Hertel Ave., Buffalo, N. Y. The pulley covering, known by the trade name "Nonslip," comes in sheets of 9 square feet. It is then cut in strips of the proper width and length to go twice around the pulley to be covered, including the lapping. A single application of the pulley covering usually lasts for a couple of years. It is claimed to eliminate practically all belt slippage. 204

To obtain additional information about materials described on this page, see lower part of page 134.

Aluminum Wheels Now Being Used on Trucks and Buses

Aluminum wheels are largely used in the airplane field, where lightness is essential. It is not generally known, however, that cast-aluminum wheels are being more and more used on trucks and buses. The use of aluminum wheels reduces the unsprung weight of the vehicle. By reducing the unsprung weight, the riding qualities are improved. Aluminum brake-drums are also used, with iron liners shrunk and bolted in place. This construction results in a 30 per cent saving in weight. Generally speaking, the use of aluminum wheels on commercial vehicles reduces the unsprung weight 40 per cent, as compared with the use of steel. This means that there is a decrease in road shock, and as a result a reduction in vehicle maintenance costs. 205

Huge Flywheels Made from Steel Plate

Steel-plate flywheels can be operated safely at much higher peripheral speeds than cast flywheels. One steel-plate flywheel now in service is said to be used at peripheral speeds up to 14,000 feet per minute. Fig. 1 shows one of two steel-plate flywheels recently made by the Lukens Steel Co., Coatesville, Pa., for the Mesta Machine Co., Pittsburgh, Pa.

Fig. 1. Flywheel Made from a Solid Steel Plate over 9 Inches Thick, Weighing Approximately 50,000 Pounds when Finish-machined

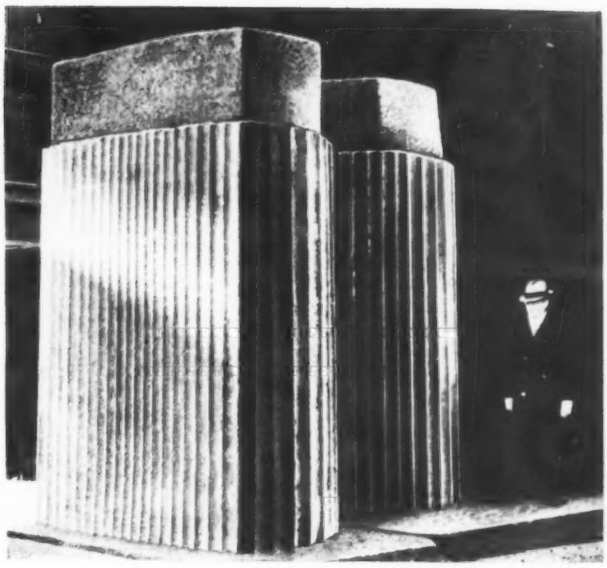


Fig. 2. Ingots Weighing 110,000 Pounds Each are Used for Making the Plate from which the Flywheel was Flame-cut

These are believed to be the largest and heaviest steel-plate flywheels ever made. Each of the flame-cut steel plates, before machining, weighed approximately 56,300 pounds. They were 165 inches in diameter by 9 1/8 inches thick.

To make these steel plates, it was necessary to pour two of the largest and heaviest ingots ever cast at the Lukens Works, one ingot being made for each flywheel. These ingots, as shown in Fig. 2, are 135 inches high, 90 inches wide, 40 inches thick, and weigh 110,000 pounds each, including the 17,000-pound hot top. 206

Colaweld Atomic-Welding Liquid, Paste, and Rod

Colaweld liquid, paste, and rod for the atomic welding of metals without the use of welding apparatus, have been placed on the market by the Colonial Alloys Co., E. Somerset St. and Trenton Ave., Philadelphia, Pa. The paste and rod are intended for welding practically all non-ferrous metals, including aluminum, while the liquid and rod are suitable for welding stainless and low-carbon steels and practically all ferrous alloys. Metal from 0.005 to 0.050 inch in thickness can be readily welded.

Colaweld atomic-welding liquid or paste is simply brushed on the metal at the points where welding is to take place, while the rod is applied with the metal heated to about 450 degrees F. Welding is completed within a few seconds. This process is not intended as a substitute for welding by regular methods, but rather for many applications that heretofore have presented difficulties in welding. 207

To obtain additional information about materials described on this page, see lower part of page 134.

NEW TRADE  LITERATURE

Recent Publications on Machine Shop Equipment, Unit Parts and Materials. To Obtain Copies, Check on Form at Bottom of Page 133 the Identifying Number at End of Descriptive Paragraph, or Write Directly to Manufacturer, Mentioning Catalogue Described in the May Number of MACHINERY

Electric Equipment

GENERAL ELECTRIC CO., Schenectady, N. Y. Bulletins GEA-1184D, on alternating-current magnetic motor-starting switches; GEA-2915A, on general-purpose capacitor motors; GEA-3301 on Reactrol system for controlling electrically heated equipment; and GEA-3337, announcing a new method for reducing the KVA demand of resistance welding machines. 1

Portable Grinding Equipment

NORTON CO., Worcester, Mass. Booklet containing valuable information to users of grinding equipment on the selection of the proper grain and grade of wheel for different classes of work, as well as on the use of portable grinding wheels for finishing welds, for jobs in the toolroom, die shop, railroad and car shops, and other applications. 2

Turret Lathe Tools

JONES & LAMSON MACHINE CO., Springfield, Vt. Catalogue describing a complete line of tools and equipment for Jones & Lamson turret lathes, with dimensional diagrams and tool numbers for the various machines, and a section devoted especially to tools for flat turret lathes. 3

Instructions for Machining Plastics

CARBIDE AND CARBON CHEMICALS CORPORATION, UNIT OF UNION CARBIDE AND CARBON CORPORATION, 30 E. 42nd St., New York City. Booklet containing detailed recommendations on how to machine and fabricate Vinylite resins by common metalworking and woodworking methods. 4

Doall Machines in Stamping Production

CONTINENTAL MACHINES, INC., 1312 S. Washington Ave., Minneapolis, Minn. Folder describing three methods of making stampings by the aid of Doall machines; also containing a hunting knife blank of high-grade steel that can be made by these methods. 5

Die-Casting Machines

PHOENIX MACHINE CO., 2711 Church St., Cleveland, Ohio. Circular descriptive of the Phoenix-Lester high-speed, high-pressure die-casting machine, designed to maintain uniform pressure throughout the cycle, and thus produce homogeneous die-castings of uniform size, density, and weight. 6

Anti-Friction Bearings

NEW DEPARTURE DIVISION OF GENERAL MOTORS SALES CORPORATION, Bristol, Conn. Book entitled "Why Anti-Friction Bearings?" 112 pages, discussing the factors to be considered in the selection of anti-friction bearings—an exhaustive treatise on the subject. 7

Hydraulic Automatic Lathes

GISHOLT MACHINE CO., 1209 E. Washington Ave., Madison, Wis. Bulletin illustrating and describing the constructional features and applications of the company's No. 12 hydraulic automatic lathe for a wide variety of chucking and between-centers work. 8

Power Squaring Shears

NIAGARA MACHINE & TOOL WORKS, 637-697 Northland Ave., Buffalo, N. Y. Bulletin 72-A, describing Niagara new series high-production power squaring shears which have capacities ranging from No. 10 gage to 3/8 inch. 9

Staybolt and Navy Chain Iron

JOSEPH T. RYERSON & SON, INC., 16th and Rockwell Sts., Chicago, Ill. Bulletin descriptive of Lewis special staybolt iron, solid staybolts, engine bolt iron and U. S. Navy chain iron. Applications, physical properties, available sizes and shapes, and other data are included. 10

Turret Punching Machines

WIEDEMANN MACHINE CO., 1801 Sedgley Ave., Philadelphia, Pa. Circular describing the Wiedemann turret punching machines with from twelve to thirty-two stations, developed for the economical production of small lots requiring a number of operations. 11

Dust Control Equipment

AMERICAN AIR FILTER CO., INC., Louisville, Ky. Bulletin 270, illustrating many different installations of "Roto-Clone" dust control equipment in machine shops, foundries, etc., indicative of the diversity of dust problems for which this equipment provides a simple solution. 12

Power Transmission Equipment

BOSTON GEAR WORKS, INC., North Quincy, Mass. Catalogue 53 containing 288 pages of specifications and list prices covering Boston stock gears, chain and sprockets, motorized speed reducers, and other power transmission equipment. 13

High-Speed Drilling and Tapping Machines

EDLUND MACHINERY CO., INC., Cortland, N. Y. Bulletin 107, descriptive of Edlund Nos. 2 M.S. and 4 M.S. drilling and tapping machines, built with from one to eight spindles for rapid production. 14

Flanged Heads

LUKENS STEEL CO., Coatesville, Pa. Catalogue 1, containing 132 pages of data on pressed and spun heads for use in machinery, tanks, pressure vessels, and other applications. Engineering data of value to the designer is included. 15

Hardness-Testing Machines

PITTSBURGH INSTRUMENT & MACHINE CO., 1026 Reedsdale St., Pittsburgh, Pa. Bulletin on Diamo-Brinell hardness-testing machine.

Bulletin covering other types of Brinell hardness testing machines and metal-sheet testers. 16

Lathes

R. K. LEBLOND MACHINE TOOL CO., Cincinnati, Ohio. 48-page catalogue completely describing and illustrating the various sizes of "Regal" lathes, together with the standard and special equipment available. 17

Chip-Breaker Designed for Carbide Tools

MCKENNA METALS CO., 147 Lloyd Ave., Latrobe, Pa. Wall chart showing new design of chip-breaker for steel cutting carbide tools, with directions for grinding chip-breaker grooves. 18

Grinding Wheels

ABRASIVE ENGINEERING CORPORATION, 15947 Turner Ave., Detroit, Mich. Booklet entitled "What Do You Know About Grinding Wheels?" Booklet describing the Grade-O-Meter, a device for accurately grading grinding wheels. 19

Compressed-Air Cleaning Equipment

LOGAN ENGINEERING CO., 4912 Lawrence Ave., Chicago, Ill. Bulletin 340, covering Aridifier equipment, which cleans and dries compressed air and gas, removing moisture, oil, dirt, and fine scale centrifugally. 20

Milling Machines

CINCINNATI MILLING MACHINE CO., Cincinnati, Ohio. Bulletin M-868, illustrating and describing new dial type milling machines made in sizes Nos. 2, 3, and 4, and in plain, universal, and vertical styles. 21

Straight-Carbon Tool Steels

ALLEGHENY LUDLUM STEEL CORPORATION, Pittsburgh, Pa. Folder describing various types of straight-carbon tool steels and the uses for which they are best adapted, as well as suitable heat-treatments. 22

Bearing Bronze

JOHNSON BRONZE CO., 520 S. Mill St., New Castle, Pa. Catalogue 400 containing 76 pages on bronze bearings and bushings, bronze bars, electric motor bearings, babbitt, and graphited bronze bearings. 23

Grinding Machines

CINCINNATI GRINDERS INCORPORATED, Cincinnati, Ohio. Publication G-448, illustrating and describing the company's 12-inch hydraulic universal grinding machine, known as Model ER. 24

Determining Finish of Surfaces

BRUSH DEVELOPMENT CO., 3311 Perkins Ave., Cleveland, Ohio. Technical bulletin 501, describing the Brush surface analyzer for rapidly determining and recording the quality of finished surfaces. 25

Electric Equipment

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Pa. Bulletin 29-530, describing "Nofuze" circuit-breakers. Bulletin 29-550, describing safety switches for industrial and general-purpose applications. 26

Vertical Profiler and Milling Machine

MOREY MACHINERY CO., INC., 410 Broome St., New York City. Bulletin illustrating and describing a new high-speed, vertical profiler and milling machine. 27

High-Strength Steel

REPUBLIC STEEL CORPORATION, Republic Bldg., Cleveland, Ohio. Catalogue Adv. 353, on Republic double-strength steel for reducing dead weight, fabrication costs, and corrosion losses. 28

Portable Electric Tools

SKILSAW, INC., 5033 Elston Ave., Chicago, Ill. Catalogue 41, illustrating and describing the complete line of Skilsaw portable electric tools for production, maintenance, and construction. 29

Machine Parts

TOWNSEND CO., New Brighton, Pa. Folder illustrating a great number of parts made for the trade that are headed, collared, shouldered, threaded, knurled, tapered, grooved, or pointed in any combination. 30

To Obtain Copies of New Trade Literature

listed on pages 132-134 (without charge or obligation), mark with X in the squares below, the publications wanted, using the identifying number at the end of each descriptive paragraph; detach and mail to:

MACHINERY, 148 Lafayette St., New York, N. Y.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	

Name ..... *Position or Title* .....

[This service is for those in charge of shop and engineering work in manufacturing plants.]

Firm .....

Business Address .....

City ..... *State* .....

[SEE OTHER SIDE]

Die-Castings

NEW JERSEY ZINC Co., 160 Front St., New York City. Booklet entitled "Designing for Die-Casting," containing information of value to those interested in the design and manufacture of metal parts. 31

Molding Presses

F. J. STOKES MACHINE Co., Tabor Road, Olney P. O., Philadelphia, Pa. Folder describing standard semi-automatic molding presses for plastic molding and mechanical rubber goods. 32

Milling Machines and Attachments

BRIDGEPORT MACHINES, INC., 52 Remer St., Bridgeport, Conn. Circulars descriptive of turret milling machines and high-speed milling attachments. 33

Metal-Cutting Tools

WELDON TOOL Co., 3000 Woodhill Road, Cleveland, Ohio. Catalogue 8, containing 80 pages covering end-mills, T-slot cutters, cut-off tools, form tools, holders, adapters, and other tools. 34

Universal Jigs

CLEVELAND UNIVERSAL JIG Co., 13404 St. Clair Ave., Cleveland, Ohio. Catalogue 40, illustrating and describing a great variety of universal jigs, jig parts, index tables, and angle-plates. 35

Temperature Recorders

LEEDS & NORTHRUP Co., 4921 Stenton Ave., Philadelphia, Pa. Bulletin N-33B-685(1), entitled "Rolling Temperatures Recorded by Speedomax." 36

Electric Welding

LINCOLN ELECTRIC Co., P.O. Box 5758, Cleveland, Ohio. Folder entitled "Life on the Welding Front," illustrating and describing numerous unusual arc-welding jobs. 37

Shapers

CINCINNATI SHAPER Co., Cincinnati, Ohio. General catalogue N, illustrating and describing the Cincinnati line of rapid-traverse shapers, universal shapers, and utility shapers. 38

Texrope V-Belt Drives

ALLIS-CHALMERS MFG. Co., Milwaukee, Wis. Catalogue 151, entitled "Tex-Book of Engineering Information on Special or Made-to-Order Texrope V-Belt Drives." 39

Leather Packing

E. F. HOUGHTON & Co., Third and Somerset Sts., Philadelphia, Pa. Catalogue covering Vim leather packings for hydraulic and pneumatic use. 40

Industrial Furnaces

SURFACE COMBUSTION CORPORATION, Toledo, Ohio. Catalogue covering a complete line of gas-fired industrial furnaces, burners, and appliances. 41

Nut-Slotting Machines

PELLOW MACHINE Co., 6527 Epworth Blvd., Detroit, Mich. Circular describing Duplex nut-slotting machines for production work. 42

Universal Grinding Tool

CHICAGO WHEEL & MFG. Co., 1101 W. Monroe St., Chicago, Ill. Catalogue of the Handee grinding tool —the tool of 1001 uses. 43

Tool Steel

JESSOP STEEL Co., 605 Green St., Washington, Pa. Bulletin on "Truform" oil-hardening, non-shrinkable, alloy tool steel. 44

Air-Operated Controllers

BRISTOL Co., Waterbury, Conn. Catalogue 4050, describing air-control instruments and their applications. 45

Oil-Retaining Bearings

BOUND BROOK OIL-LESS BEARING Co., Bound Brook, N. J. Booklet listing dimensions of "Compo" oil-retaining porous bronze bearings. 46

Knurling and Cut-Off Tools

BILLINGS & SPENCER Co., Hartford, Conn. Folders covering drop-forged knurling tools and cut-off tools for bar stock. 47

To Obtain Additional Information on Shop Equipment

Which of the new or improved equipment described on pages 135-149 is likely to prove advantageous in your shop? To obtain additional information or catalogues about such equipment mark with X in the squares below, the identifying number found at the end of each description on pages 135-149 — or write directly to the manufacturer, mentioning machine as described in May MACHINERY.

51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94

Fill in your name and address on other side of this blank.

To Obtain Additional Information on Materials of Industry

To obtain additional information about any of the materials described on pages 130-131, mark with X in the squares below, the identifying number found at end of each description on pages 130-131 — or write directly to the manufacturer, mentioning name of material as described in May MACHINERY.

201	202	203	204	205	206	207

Fill in your name and address on other side of this blank.

Detach and mail to MACHINERY, 148 Lafayette St., New York, N. Y.

[SEE OTHER SIDE]

Shop Equipment News

Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on the Market

Cincinnati Dial Type Milling Machines

The Cincinnati Milling Machine Co., Cincinnati, Ohio, has placed on the market a new line of plain, universal, and vertical dial type milling machines built in three sizes, Nos. 2, 3 and 4, and with two speed and feed ranges designated "medium speed" and "high speed." These machines have been designed for rapid metal removal within close limits of accuracy and with a good finish, special attention having been given to convenience of control.

Speeds and feeds are controlled by a single lever at the front of the machine which is extended to permit duplicate control from the rear working position. The lever has two positions, indicated as "speed" and "feed." When moved to the "speed" position, for example, the speed dial at the left-hand side of the column rotates. When the lever is returned to neutral, the dial stops, and the proper gears are in mesh to obtain the spindle speed indicated by the arrow. Thus the machine does the work of shifting gears, no effort being required of the operator other than moving a small lever that releases the power for shifting the gears. The feeds are also changed in the same manner. All the controls are duplicated at the rear working position.

Power feed controls at the front of the knee have been rearranged for greater convenience. Power, longitudinal, cross, and vertical feeds are engaged by independent feed levers, the feed movement being in the direction in which the lever is moved. All sizes and styles of these machines have power rapid traverse in six directions. All parts within the column and knee units are automatically lubricated, while the parts within the saddle are lubricated by a single "oil shot" system.

The column is made of Meehanite metal and has heavy ribbing throughout to permit operation at maximum cutting capacity. Other improvements include a wider over-arm and more clutch plates in the main drive clutch.

A hydraulic Servo control engages the clutch, relieving the operator of all starting effort, except a light touch on the starting lever. This design permits the spindle to be "inched" along with negligible effort. There is positive and full engagement of the clutch when the spindle is rotating, engagement being instantaneous. Since the Servo control

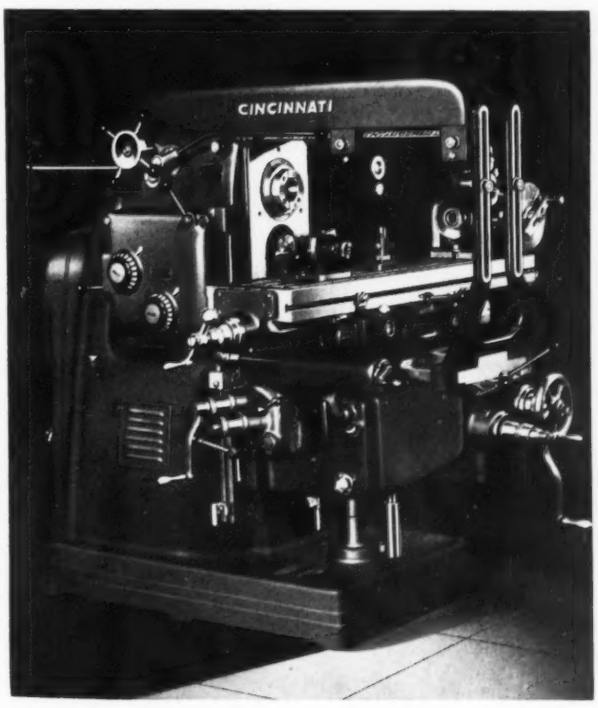


Fig. 1. Cincinnati No. 2 Universal High-speed Dial Type Milling Machine

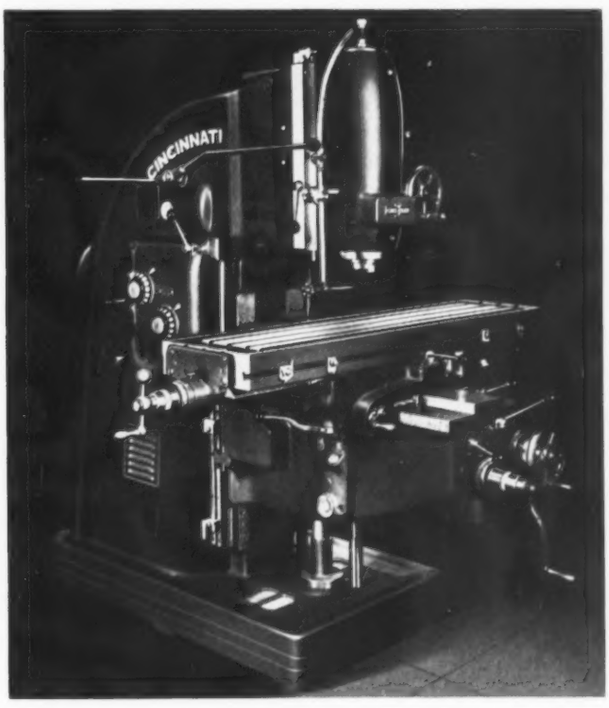


Fig. 2. Cincinnati No. 3 Vertical High-speed Dial Type Milling Machine

To obtain additional information on equipment described on this page, see lower part of page 134.

also operates the spindle brake, the spindle rotation is stopped instantaneously when the clutch is disengaged.

The micrometer dials have been redesigned to provide greater convenience, safety, and accuracy. Another safety feature is the motor cut-out switch which prevents the motor from starting when the hinged cover has been opened for adjusting the belt tension or inspecting the motor. A new type of brace, as shown in Fig. 1, is provided as regular equipment with the horizontal machine. This brace is clamped to the top surface of the knee, and may be set close to the saddle. 51

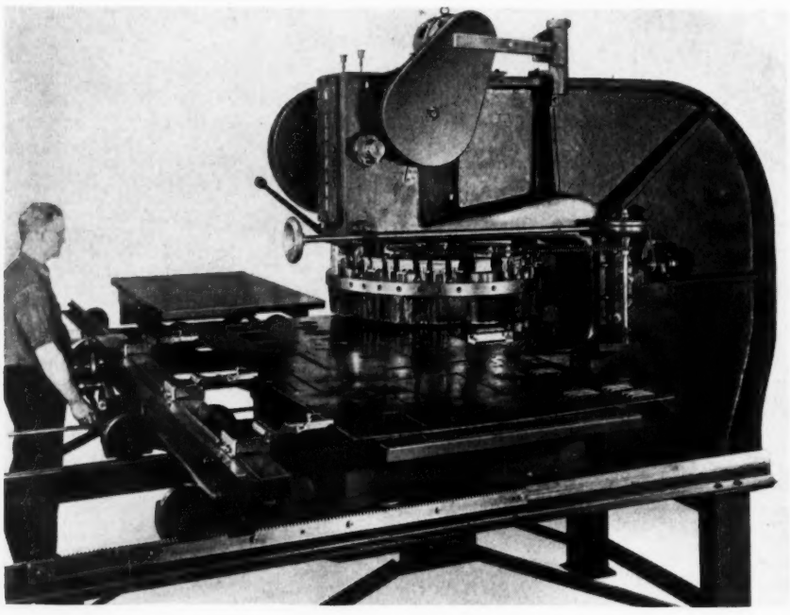
Wiedemann Motor-Driven Turret Punch

The Wiedemann Machine Co., 1801 Sedgley Ave., Philadelphia, Pa., has just brought out a motor-driven turret punch, which can be furnished with from twelve to thirty-two stations and with a direct-reading, ball-bearing gage table for spacing holes in sheets up to 50 inches wide, 100 inches long, and 1/8 inch thick. This machine—the Type R-8—is intended as a companion machine for the Type R-7 turret punch, which handles plates up to 1/4 inch thick.

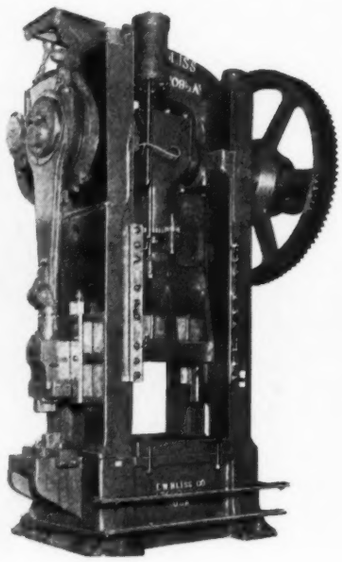
The new machine can be supplied with or without the gage table. When equipped with the gage table, as illustrated, it is especially adapted for cutting openings, piercing holes, forming louvres, notching, etc., in refrigerator panels and panels for switchboards, as well as panels used in arsenals, navy yards, aircraft plants, etc.

The machine has a 54-inch throat, weighs 21,000 pounds, and has a capacity for exerting a pressure of 100,000 pounds. It will punch a hole 5 inches in diameter in mild steel 1/8 inch thick. A hole 6 inches in diameter or a square opening 6 by 6 inches can be punched in 1/8-inch mild steel with shearing punches. The upper and lower turrets are geared together, and can be operated either by handwheel or motor drive. Foot-pedal control is of the single-stroke, safety type, and cannot be operated unless the turrets are properly positioned.

The standard stroke is 1 3/8 inches, but this can be varied to suit. The machine can be operated at the rate of 100 strokes per minute. It requires a 3-H.P., 1800-R.P.M. motor for the main drive, and a 1/2-H.P., 1800-R.P.M. motor for operating the turret, which makes 6 R.P.M. The machine requires a floor space of 10 feet 6 inches long by 4 feet 3 inches wide, and has a height of 8 feet. When equipped with the gage table, a floor space of 16 feet long by 16 feet wide is required. The handwheels for moving the gage table are graduated on the outer surfaces. The scales and graduations can be furnished in metric dimensions, if desired. 52



Wiedemann Motor-driven Turret Punch Equipped with Direct-reading Ball-bearing Gage Table



Heavy-duty Trimming Press that Operates at 25 Strokes a Minute

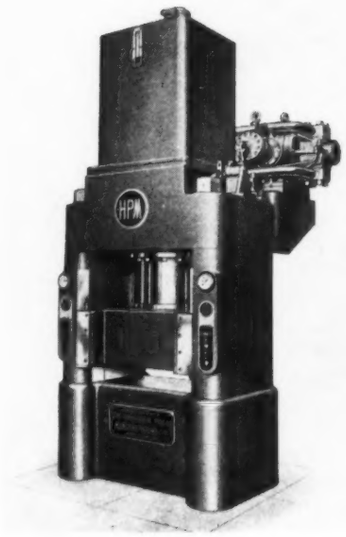
Bliss Heavy-Duty Trimming Press

The E. W. Bliss Co., 53rd St., and Second Ave., Brooklyn, N. Y., is bringing out a new line of trimming presses for use in forge shops and related industries. The No. 209-1/2-A straight-sided, single-crank press illustrated is one of the many presses in this line. The new presses are built to meet the high-production requirements and hard usage of the modern forge shop. They are equipped with an outside slide attachment for cutting the flash from the bars, punching holes, and trimming.

The press is of tie-rod construction, with the steel tension rods shrunk in under a pressure 100 per cent over that of the press rating, and with beam and compression members cast from irons of high physical properties.

The split clamping action previously employed in the connections has been superseded by solid straps with a cross-grip action, which insures positive holding and increased strength. Other features included in the new trimming press illustrated are the quick-acting rolling key clutch; V-belt drive; and air counterbalance for the slide. The press is furnished with a lubrication system which supplies the main bearings and other members with oil through pressure fittings that are within the reach of a man on the floor. The single-geared machine shown operates at a speed of twenty-five strokes per minute, and weighs about 57,500 pounds. 53

To obtain additional information on equipment described on this page, see lower part of page 134.



Fastraverse Press Built by the Hydraulic Press Mfg. Co.

250-Ton H-P-M Fastraverse Press

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has recently built a 250-ton Fastraverse press believed to be one of the fastest operating hydraulic presses ever constructed. On its test run, this machine, using a stroke of 3 inches, was operated at a speed of 47 complete cycles per minute, building up a pressure on the solid bed to a maximum of 250 tons on each cycle.

The pressing surface (the slide, platen, or ram facing) is advanced to the work by means of gravity. Oil used as a pressure medium prefills the pressure cylinder by gravity, flowing unobstructed through a surge valve mounted in the open end of the press cylinder. The surge valve automatically closes as soon as pressure is built up in the main cylinder, and automatically opens when pressure is released. The main ram, on its return stroke, actually pushes the oil from the main cylinder back into the overhead oil reservoir. With this arrangement, the pressure generator serves only two purposes—to build up a predetermined pressure in the main cylinder after the cylinder has been prefilled, and to apply pressure to the push-back rams or annular area of a double-acting piston type main ram for returning the pressing member to its original position.

Besides the Fastraverse system, there is a "closed-circuit" system, in which no operating valves are used between the pressure generator and the pressure cylinders. It is this system that makes possible the fast operation. To reverse the press movement, the direction of the pump output is reversed, thus eliminating the use of operating valves to obtain a reversal of the pressure flow. This closed circuit provides a simple means of obtaining automatic press operations with shockless reversals. The pressure generator developed for use with the Fastraverse principle and the closed-circuit system, known as the "Hydro Power" radial pump, is of the variable-reversible delivery type. This radial piston type pump is compact and designed for long service. 54

Huge Ajax Forging Machine with One-Piece Frame

A huge, eight-inch forging machine weighing nearly half a million pounds, of unusual design for a machine of such great size, has been built recently by the Ajax Mfg. Co., Cleveland, Ohio. Although disassembled as far as possible prior to shipment by rail, it was still necessary to use a special, sixteen-wheel flat car, equipped with double trucks at each end, in order to support the tremendous weight of this machine.

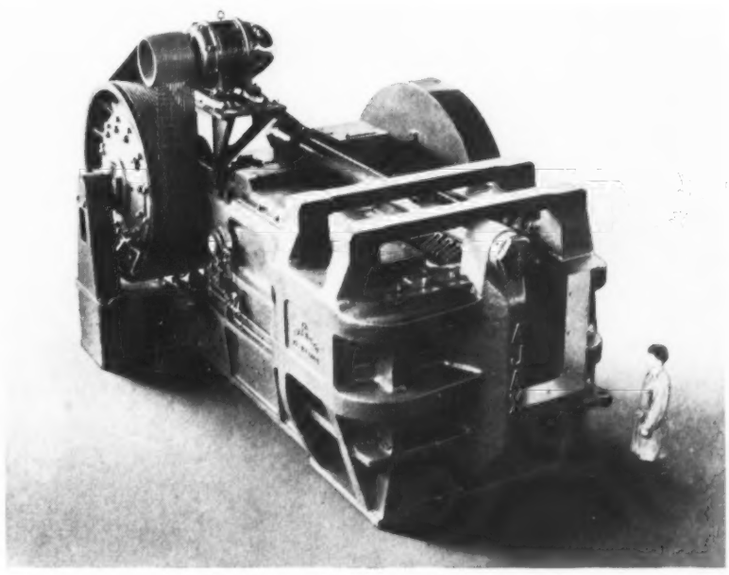
The one-piece integral frame, constructed without a joint between the crankshaft and dies, provides the longitudinal and transverse rigidity required for exact die alignment and close forging tolerances. The machine is built to produce improved forgings, in which flash and eccentricity are eliminated, and to handle a wide range of work requiring exact alignment of the dies. It accommodates dies 46 inches high, and as many as four progressive operations for fabricating heavy forgings from large stock can be handled entirely within the die seat. The exceptionally wide opening capacity of the dies permits transferring large work up and down between the various operations without interference.

The drive is furnished by a 150-H.P. motor through a V-belt drive to a flywheel and air-clutch assembly weighing approximately 35,000 pounds, which is equipped with anti-friction bearings. In spite of its huge size, this machine can be operated as easily as one of ordinary size. The tripping of a small foot-valve causes the air clutch to engage instantly and perform the forging operation. This instant response results in higher production and smooth operation.

The machine is fed from furnaces on each side by means of cranes which transport the heated stock from the furnaces to the throat or feed gap, support the bar in position between the dies, and return the bar to the furnaces for heating. 55

Eisler Universal Spot-Welding Machine

The Eisler Engineering Co., 740-770 S. 13th St., Newark, N. J., has recently developed a "Universal No.



Forging Machine Weighing 470,000 Pounds, Developed by the Ajax Mfg. Co. to Handle Heavy Work

To obtain additional information on equipment described on this page, see lower part of page 134.

310" spot-welding machine. This new machine has sliding welding horns, and is adapted for a wide range of sheet-metal work. It is so designed that it will perform spot-welding, as well as push-welding, gun-welding, and arc-welding operations.

The machine is supplied with individual controls for each type of welding operation. It can be arranged for air operation, and the equipment is made for 25, 40, 50, and 60 cycles, 220, 440, or any other voltage. 56

Hardinge Precision Tool-Room Milling Machine

Hardinge Brothers, Inc., Elmira, N. Y., have recently brought out a precision, preloaded, ball-bearing, tool-room milling machine designated the Model TM. This machine replaces the previous BB5 model described in July, 1938, MACHINERY, page 811, and is especially designed to handle tool-room and laboratory work. The longer vertical travel of the new machine permits the index-head to be used in the vertical position.

The horizontal spindle nose and the spindle nose of the index-head are both the same, and are of the threaded type. This permits interchangeability of chucks and other spindle-nose fixtures. The collets are also interchangeable between the horizontal spindle and the index-head spindle. The horizontal spindle has been extended over the table to permit small end-mills to be used without employing overhung adapters.

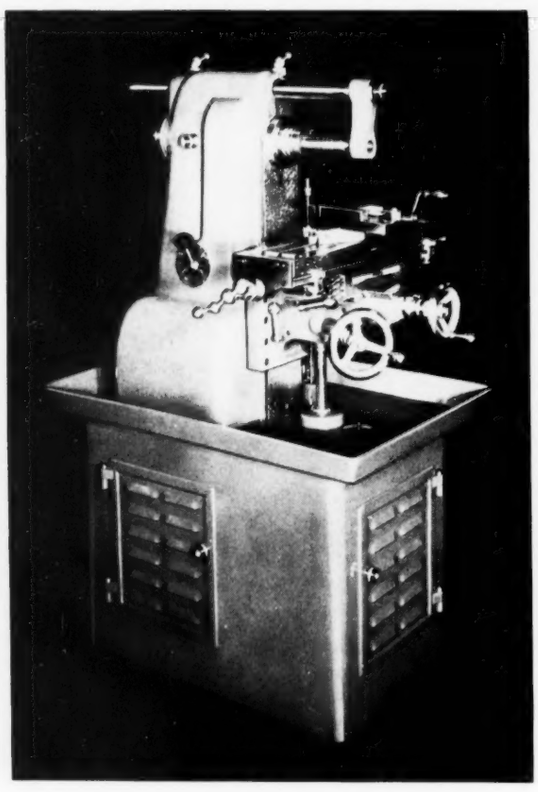
Two high-spindle speed ranges are available, one from 110 to 1850 R.P.M., and the other from 110 to 2775 R.P.M. In both cases, the slow spindle speed is retained for use when required. The machine is equipped throughout with anti-friction bearings, even the over-arm being so equipped to eliminate any possibility of "freezing" at high spindle speeds.

The column of the machine has been redesigned to provide greater rigidity for heavier cuts. Operation is simplified by the use of one lever only, which operates an electrical control mounted on an accessible panel inside the column. The steel pedestal completely encloses the driving unit. The bevel gears and traverse feed-nut are completely enclosed in the box type knee. All slides are taper-gibbed, and large dials are graduated to 0.001 inch. The machine is available with or without power feed for longitudinal travel of the table. The power feed is of the V-belt driven type. Thirty-two feeds are available, ranging from approximately 1/8 inch to 13 inches per minute.

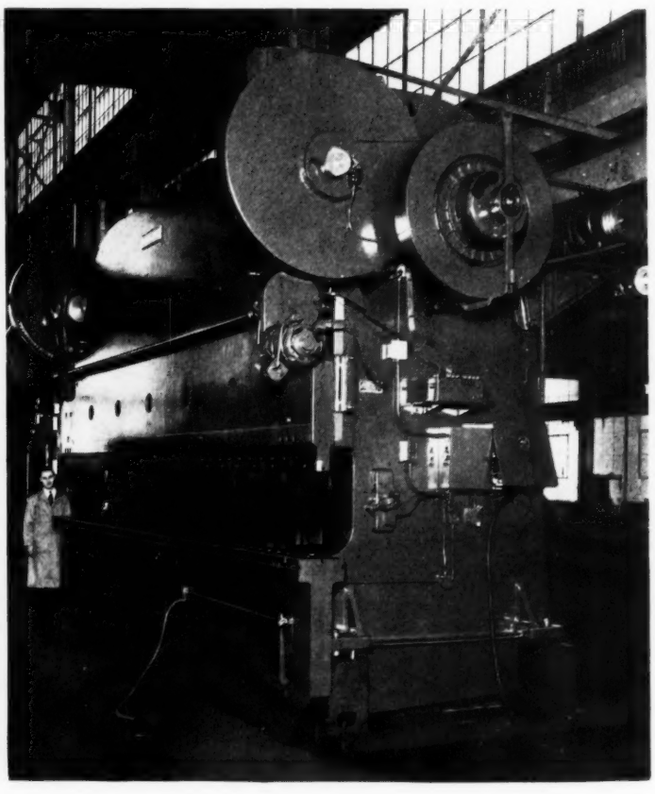
The longitudinal range is 14 inches, the longitudinal power feed for the table being 11 1/2 inches. The transverse feed is 5 1/2 inches and the vertical feed 13 1/4 inches. The maximum distance from the top of the table to the center of the spindle is 12 inches. The table has a working surface of 20 3/4 by 6 inches. The floor space required is 46 by 62 inches. The weight of the machine is 870 pounds. 57

Huge Press Brake Built for Aircraft Industry

The huge, 340 series, all-steel press brake here illustrated was completed recently by the Cincinnati Shaper Co., Cincinnati, Ohio, and installed in the Alcoa, Tenn., plant of the Aluminum Co. of America, where it will be used for corrugating and forming aircraft aluminum alloy



Hardinge Precision Tool-room Milling Machine with Preloaded Ball-bearing Spindle Construction

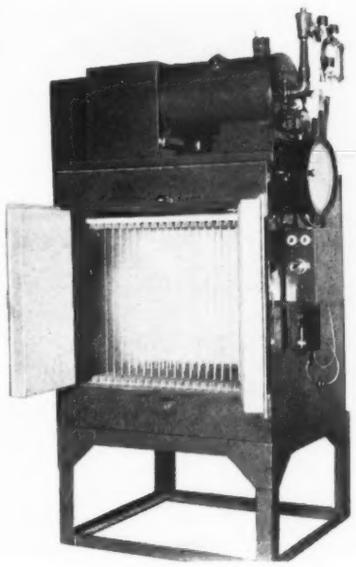


Huge Press Brake Built by the Cincinnati Shaper Co. for Corrugating Large Metal Sheets

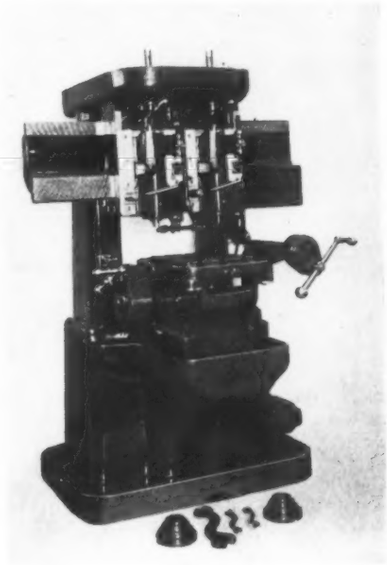
To obtain additional information on equipment described on this page, see lower part of page 134.

materials. This press brake is believed to be the largest ever built for the aircraft industry, the distance between the housings being 18 feet 6 inches, and the total over-all die surface 21 feet 3 inches. The housings, bed, and ram are of rolled steel plate.

This machine is equipped with a taper adjustment for the ram, air counterbalances, tonnage-load indicator, electric clutch control, and automatic electric overload clutch release. It will corrugate, on a production basis, large metal sheets such as are used for the fuselage, wing stiffeners, formed channel sections, cap strips, and wing tip sections of military and transport planes. 58



Despatch Furnace for Tempering and Drawing Coiled Band-saw Blades



Two-spindle Vertical Profiler and Milling Machine

Despatch Tempering and Drawing Furnace

A furnace designed for tempering and drawing band-saw blades, which are wrapped in coils and rolled into the heating chamber in an upright position, has recently been built by the Despatch Oven Co., Minneapolis, Minn., for the Continental Machines, Inc. The framework in the heating chamber is used to hold the band-saw coils in an upright position, and can be entirely removed to permit handling other work.

The particular furnace illustrated can be operated at a maximum temperature of 800 degrees F., but furnaces of the same type can also be furnished for operation at a maximum temperature of 1250 degrees F. by increasing the insulation thickness, lining the side with Allegheny metal and providing suitable reinforcements.

The furnace shown is 35 inches wide, 30 inches high, and 30 inches deep. The outstanding feature is the use of a new "Despatch" controlled combustion air heater, mounted at the top, with a high-temperature, high-capacity fan for supplying heat to the furnace. The air is forced into ducts at the bottom of the furnace, and the recirculating ducts are located at the top. The air travel is vertical, and by using a large-capacity fan, uniform heating within plus or minus 3 to 5 degrees is easily obtained. The furnace is equipped with recording-temperature control and safety equipment. 59

High-Speed Vertical Profiler and Milling Machine

A No. 12M high-speed, vertical profiler and milling machine adapted for the economical manufacture of small parts requiring accurate interchangeability has been designed and built by the New York Tool Co., Inc., subsidiary of the Morey Machinery Co., Inc., 406 Broome St., New York City. This machine is regularly built with two spindles, as shown in the illustration, but can be furnished with only one spindle if desired.

The cross-rail is so designed that the slide castings carrying the spindles and the motors are in balance, a feature that practically eliminates vibration. The table of the machine can be lowered to increase the distance between the end of the spindle and the table to a maximum of twelve inches without changing the height from the cross-rail to the floor or the height from the floor to the spindle-operating levers. A removable filler block permits the distance from the spindle nose to the table to be increased or decreased without using riser blocks under the side housings.

The spindles are regularly equipped with high-speed, preloaded, antifriction, precision, permanently lubricated and sealed bearings designed for spindle speeds up to 2000 R.P.M., but can also be equipped with bearings designed for maximum speeds of 10,000 R.P.M.

The spindles are driven independently by dynamically balanced vertical motors—not supplied as regular equipment—through a four-step V-belt drive. All shafts in the control mechanism are mounted on ball bearings, the gears having a simple adjustment to take up backlash, so that the milling operations can be controlled with great precision. Counterbalanced levers are provided in convenient positions for controlling the vertical movement of the spindle slides. Positive, vertical, micrometer adjustable stops are provided for each spindle with dials graduated in 0.001 inch.

The copying pins are carried in blocks that have a taper attachment controlled by a screw which simplifies the final setting. The table has a working surface of 12 3/4 by 15 1/4 inches, and a longitudinal travel of 23 inches. The machine is 64 1/4 inches wide, with the cross-slide out, 48 inches deep, and 78 inches high. The two-spindle machine weighs 3450 pounds, and the single-spindle machine weighs 2950 pounds. 60

Westinghouse 58-Inch Fluorescent Lamp

A new 85-watt, 58-inch, Type RF fluorescent lamp producing white light, designed especially for industrial service, has just been brought out by the Lamp Division of the Westinghouse Electric & Mfg. Co., Bloomfield, N. J. The new lamps can be operated on either 105-125-volt or 210-225-volt, 60-cycle alternating-current circuits in special equipment

To obtain additional information on equipment described on this page, see lower part of page 134.

which provides direct current through the use of a rectifying device. The new white and the blue-white lamps are interchangeable in single and twin fixture units.

The color of the light produced by the white lamp is somewhat like that furnished by the daylight Mazda F (fluorescent) lamp. It is suitable for a wide variety of industrial uses, including those where color discrimination is important. The light output is about the same as that of the blue-white unit rated at 4250 lumens. 61

Hannifin Hydraulic Forcing Press

The Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill., has developed a new hydraulic forcing press of 25 tons capacity, with welded steel frame construction, built-in, motor-driven, hydraulic power unit, and the Hannifin sensitive pressure control, which provides an infinitely variable pressure, from a few pounds to full capacity, under the control of a single lever.

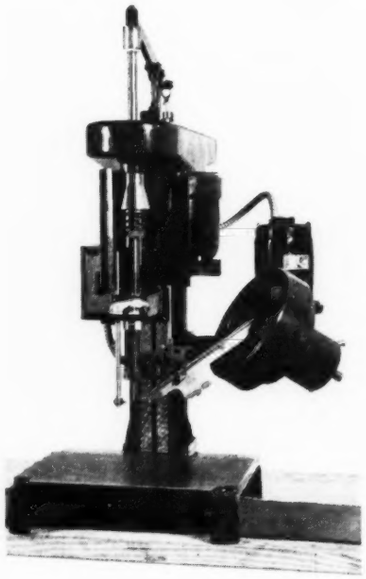
The welded steel frame construction, with the hydraulic power unit completely enclosed, simplifies installation and requires less floor space. The new press has a stroke of 24 inches. The table is 30 by 22 inches, the gap 25 inches, and the reach 15 inches. The over-all height is 113 inches, and the distance from the table to the floor is 40 inches. Operating speeds are 83 inches per minute for the power stroke, and 157 inches per minute for the return stroke. The hydraulic power unit is driven by a 10-H.P. motor 62

Power Screwdriver with Magazine Feed

A new magazine-feed power screwdriver for driving small screws has recently been developed by the Detroit Power Screwdriver Co., 5365 Rohns Ave., Detroit, Mich. This new machine will handle screws in sizes from No. 2 to No. 6 and in lengths of from 1/8 to 7/8 inch. The machine is sturdily built, yet the spindle clutch is so sensitive that there is no danger of twisting off screwheads, even when driving No. 2 brass screws.

The hopper is driven by an individual motor unit to provide a constant hopper speed, regardless of the spindle speed. The model illustrated is so designed that it can be placed over a 12-inch conveyor belt if desired. It is operated by a foot-treadle, only a touch of the foot being necessary to operate the spindle; thus the operator experiences little fatigue.

All adjustments can be made easily. The screws are always in sight of the operator, and there is no marring of the heads. The tension with which the screws are driven is controlled by a simple adjustable locknut on the lower spindle. 63



Power Screwdriver with Magazine Feed

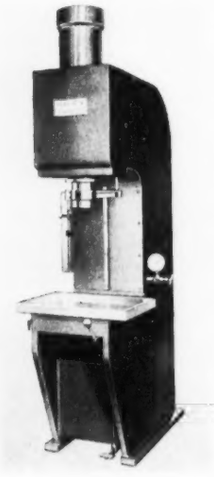
Kent Duplex Horizontal Drilling Machine

The Kent Machine Co., Cuyahoga Falls, Ohio, has brought out a new type, horizontal, duplex-spindle, drilling machine designed primarily for drilling cotter-pin holes through the heads or shanks of screws, bolts, etc. It is also adapted for similar drilling operations on a variety of work. The action of the drill spindles is such that the drills enter opposite sides of the work simultaneously and proceed to a point near the center. One of the drills is then withdrawn and the other follows through, completing the hole. The work is rigidly held between two jaws which centralize it and are provided with drill bushings for guiding the drills.

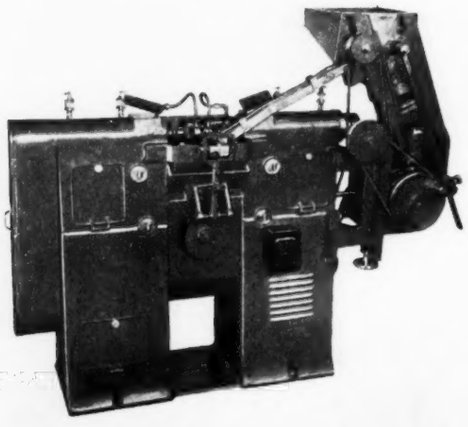
The speed of the drill spindle, the feed of the drill, and the depth of cut can be varied independently. A single motor is located inside the base, with independent drives to each drill spindle and with a worm-gear drive that controls the drill feed and operates the work-holding jaws.

The main drive-shaft in the base carries a sprocket for driving the cutting lubricant pump. The coolant is piped to the drill bushing holders. The machine can be furnished either with a semi-automatic or a fully automatic work-feeder. The one shown in the illustration is fully automatic, including a hopper, galley from the hopper to a transfer mechanism, and the transfer mechanism which carries the work from the galley to the work clamping jaws. The hopper can be eliminated and the work fed into a short galley, from which it is taken into the clamping jaws by the transfer mechanism.

The machine has a capacity for drilling either the shanks or heads of screws in sizes up to 9/16 inch. The drill capacity is 1/4 inch. The



Hannifin Hydraulic Forcing Press



Horizontal Duplex Drilling Machine Brought out by the Kent Machine Co.

To obtain additional information on equipment described on this page, see lower part of page 134.

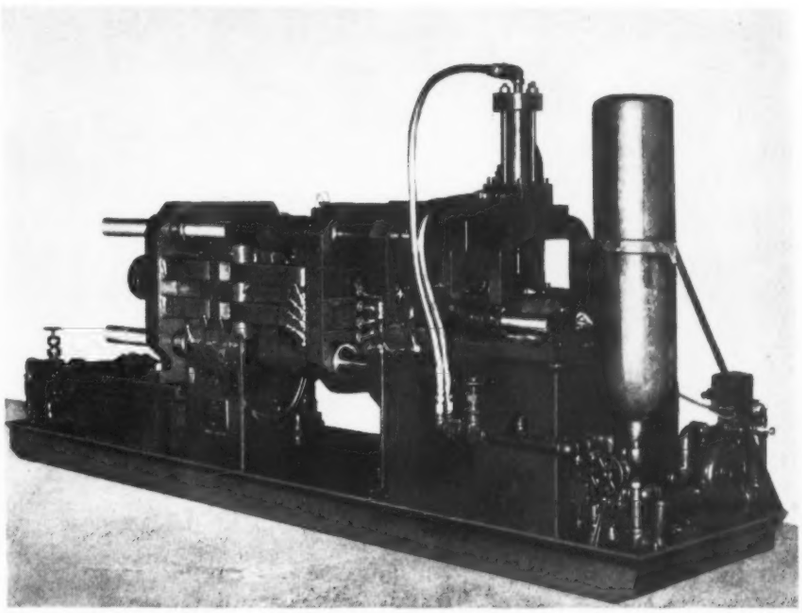
combination of speed and feed controls adapts the machine for drilling any variety of steel. The production limiting factor is the maximum feed and speed that can be employed for the particular type of steel to be drilled. 64

Speed Lathes Equipped with Vacuum Chucks

A large number of pieces in a variety of shapes and sizes ranging from small cups, plates, and disks to huge stainless-steel bowls, 22 inches in diameter and 10 inches deep, produced in a cream separator plant, are given the flawless, mirror-like finish required, both inside and out, on a battery of eight polishing machines made by the Schauer Machine Co., 2066 Reading Road, Cincinnati, Ohio. These machines are all equipped with specially designed vacuum chucks. Ordinary methods employed to hold the various separator parts for grinding and polishing were not only too slow, but resulted in scratches and abrasions. The application of vacuum chucking resulted in higher production, as well as a better quality of work.

Both the inside and the outside surfaces of the same pieces are polished on one lathe. The polishing lathes are provided with single- or two-speed motors of 1 H.P. or 2 H.P., depending on the work to be handled. A thermal type switch and overload relay are supplied as regular equipment. An automatic braking system brings the motor smoothly to a stop from high speed in two seconds. 65

Schauer Speed Lathe Equipped with Vacuum Chuck



Hydraulic High-pressure Die-casting Machine Developed by the G & M Mfg. Co.

G & M Die-Casting Machines

The G & M Mfg. Co., Cleveland, Ohio, has developed two new high-pressure, hydraulic, die-casting machines of improved design, one for zinc, tin, and lead-base alloys, and the other for aluminum, brass, and magnesium alloys. These machines are similar in design and construction. They have been designed to accommodate large dies, give high production rates, reduce waste, insure a tight seal on the dies and eliminate flash as far as possible.

The unusual construction of these machines is a feature that plays an important part in their efficient performance. The base, framework, die-plates, and toggle links are made of solid steel plates which are flame-cut and welded. The substitution of welding for bolting and riveting wherever possible has resulted in a heavier and stronger machine.

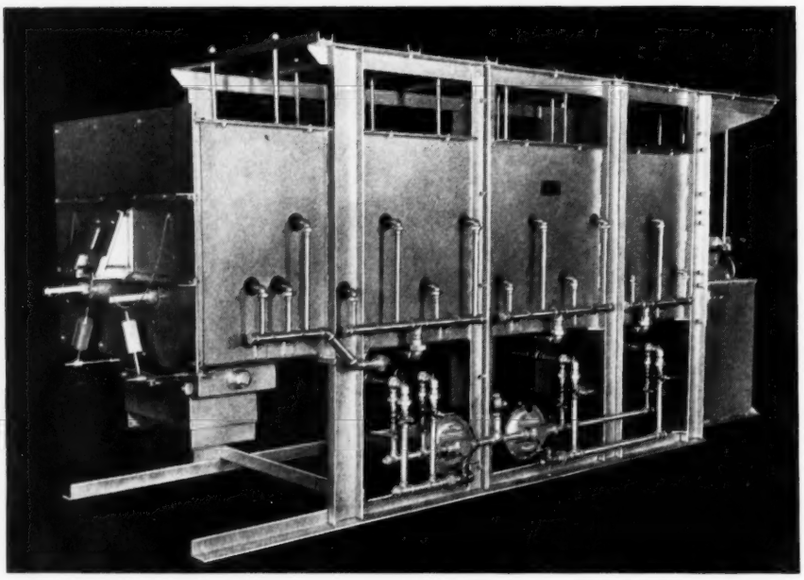
The unusually heavy die-plates are constructed to eliminate any possibility of breakage. The toggle link and die-plate are welded together, in order to increase the strength and durability. The toggle arrangement permits moving and locking the die-plates with a hydraulic pressure of less than 300 pounds against the actuating mechanism. The design of the toggle mechanism, however, provides a locking pressure of approximately 500,000 pounds.

One feature of the toggle linkage is that no strain is exerted on the link pins in stopping the forward motion of the movable die-plate, as would be the case if shoes or stops were used on the links themselves. Instead, the machines are so equipped that the actuating movement of the linkage is stopped when the hydraulic piston which moves it comes in contact with the movable die-plate when the die is locked. Steel hardened bushings are used on all bearing surfaces in the toggle linkage.

Each of the heavy tie-bars has a total bearing surface of 230 square inches, distributed over a length of 22 inches. This prevents any movement other than the straight forward movement of the die-plate, thus reducing wear and breakage of the die aligning pins. All hydraulic regulating valves have been placed on the operator's side of the machine, and all high-pressure hydraulic piping is concealed in the base. The connections are oxy-acetylene welded to prevent leakage. The motor and pump are mounted on the base, which is 48 inches wide, 182 inches long, and weighs approximately 4000 pounds.

The hydraulic valve arrangement for ejecting and core-pulling is standard equipment on both types of machines, and they are equipped with Vickers hydraulic two-stage pump and control valves. The zinc-tin-lead alloy machine is so designed that the gooseneck or the furnace pot can be replaced without disturbing the hydraulic piping. The weight of the crated machine is 18,000 pounds. 66

To obtain additional information on equipment described on this page, see lower part of page 134.



Continuous Clean Hardening Machine Built by the American Gas Furnace Co.

Reciprocating Clean Hardening Machine

A No. 191 reciprocating, full-muffle, clean hardening machine has been added to the line of the American Gas Furnace Co., Elizabeth, N. J. This is the fourth and largest machine of this type now regularly manufactured by the company. It has a capacity for hardening 400 to 600 pounds of work per hour. The available heating space is 18 inches wide by 9 feet long.

Practically any kind of work, ranging from extremely small light springs, stampings, drop-forgings, etc., up to quite large and heavy pieces, can be handled in this machine. The work may be anything from the simplest shape, such as a piston-pin, to extremely complicated shapes, because the work is not pushed through or subjected to any handling which might deform it, each piece traveling over the hearth independently under its own momentum.

All mechanisms are located outside the furnace proper, there being no bearings or other parts in the heated areas that can become "frozen" or get out of order. There are no trays and no chains or belts. The efficiency of the furnace has been increased by employing heavier insulation and by having the reciprocating muffle remain in the heating chamber at all times.

With the controls available, the time and temperature cycle can be readily adjusted to meet any requirements. The machines are furnished with a full muffle having a ribbon flame seal at the work-entering end and a special seal where the reciprocating muffle meets the stationary discharge chute. This permits any desired atmosphere to be carried in the muffle.

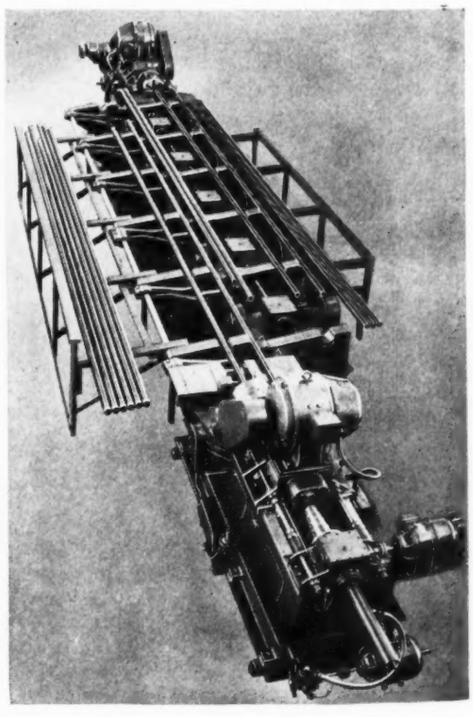
These machines can also be supplied with an open hearth having high side ribs that eliminate any possibility of work dropping into the combustion chamber. For long, thin cylindrical pieces, the bottom of the muffle is grooved so that the parts travel through the furnace with their long axis parallel with the hearth. 67

Stamets Automatic Pipe-Threading Machine

A machine for threading both ends of pipe lengths automatically is being placed on the market by William K. Stamets, Jenkins Arcade Bldg., Pittsburgh, Pa. The unit consists of two opposed threading machines and electrically operated tables, which deliver the pipe to the machines, convey and position it alternately for the threading operations, and discharge it on the unloading skids.

The threading machines have a non-rotating chuck which holds and aligns the pipe with the die-head while the threads are being cut. The rotating die is carried on a spindle that is supported by the machine carriage, which is provided with power rapid traverse movements in both directions. V-belts and worm-gears provide a smooth drive for the spindle from an adjustable-speed motor. The threading feed is obtained by means of an accurately ground lead-screw, geared to the spindle. Provision is made for changing the feed to suit any desired thread pitch.

In operation, a load of pipes is placed on skids and allowed to roll down against stops. When the unit is started, the first pipe is picked up and discharged on rolls, which move it against a stop in the proper position for threading. The pipe is then lifted from the rolls and carried into the machine chuck which closes automatically. After the threading operation has been performed, the chuck opens and the tables carry the pipe to the second threading machine; at the same time, the tables deliver another pipe to the first threading machine. The cycle is then repeated, a pipe threaded on both ends being discharged from the unit thereafter at each operation. The tables are operated by electric motors, and are electrically synchronized and interlocked with the threading machines. 68



Stamets Pipe-threading Machine Designed to Thread Both Ends of Pipe Automatically

To obtain additional information on equipment described on this page, see lower part of page 134.

Federal Comparator

One of the principal features of the improved, Model NB-60 comparator recently brought out by the Federal Products Corporation, 1144 Eddy St., Providence, R. I., is an entirely redesigned base that is supported on three feet to insure steadiness. The supporting column is heavier, and the regular supporting bracket is attached to the back of the indicator instead of to the stem. Holes are provided in the base through which an angle attachment can be fitted to hold cylindrical work or to act as a stop for work placed on the platen.

This instrument is adapted for setting and checking other gages, as well as for production inspection. It provides a quick, accurate means for checking pistons, piston-pins, valve stems, bolts, bushings, reamers, drills, taps, dies, gear blanks, etc.

An AN-4 attachment, shown in the view to the right in the illustration, can be furnished with this gage as additional equipment. This attachment takes the place of the regular supporting bracket. It provides a fine setting for the indicator by means of a thumb-screw located just in front of the post, an adjustment of 0.010 to 0.020 inch being provided. The indicator regularly furnished is graduated to 0.0001 inch, but other indicators can be substituted. 69

Doall Height and Depth Gage

The Doall height and depth gage here illustrated is a new product of Continental Machines, Inc., 1312 S. Washington Ave., Minneapolis, Minn. This gage equipment is designed to facilitate accurate micrometer readings of dimensions that must be measured in the most difficult places to reach. As shown in the illustration, the gage is furnished with rods for measuring up to 6 inches. When used as a depth gage or as an inside parallel surface gage, the measuring rods are located in the measuring position and locked. The exact depth measurement is then read quickly from a micrometer, no adding or subtracting being required.

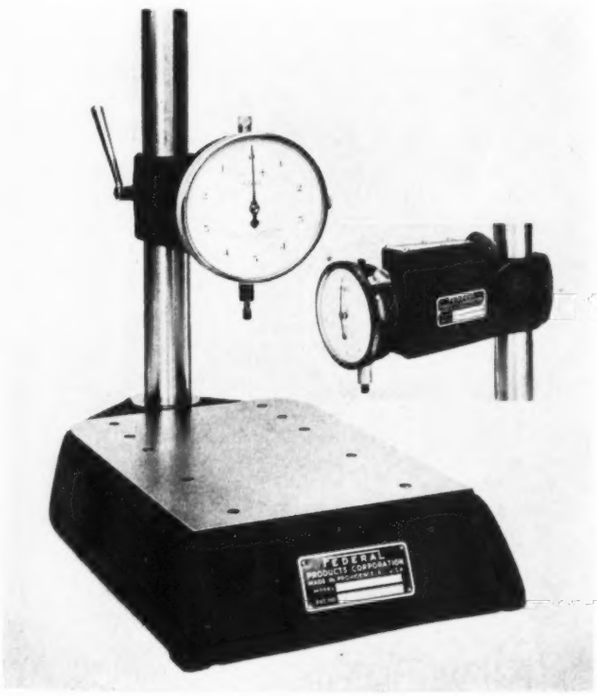
Besides its use in measuring inside dimensions, the gage can also be used for height measurements, in which case a special "height pin" is used in place of the measuring rods. With the height attachment, the gage is especially adapted for making accurate lay-out lines under magnification.

The gage has a three-point contact, regardless of whether it is used as a height or a depth gage or for measuring inside parallel surfaces, a feature which insures very accurate measurements at all times. It is especially useful in checking the dimensions of stampings, as well as in checking small quantities of parts, in place of a production gage. 70

Hydraulic Gap-frame Straightening Press

Lake Erie Hydraulic Straightening Press

A line of hydraulic straightening presses of the C type, gap-frame design, adapted for all kinds of straightening work, including finished shapes such as aircraft parts and similar pieces requiring final straightening after drawing or forming, has been brought out by



Comparator of Improved Design Brought out by the Federal Products Corporation

Doall Height and Depth Gaging Equipment Made by Continental Machines, Inc.

To obtain additional information on equipment described on this page, see lower part of page 134.

the Lake Erie Engineering Corporation, Buffalo, N. Y. The press illustrated has a rated capacity of 66 tons, the pressure being accurately controlled by a hand-lever.

The stroke of this press is 16 inches, and the fast operating speeds are at the rate of 55 inches per minute for closing; 31 inches per minute for pressing; and 70 inches per minute for the return stroke. The entire press is self-contained, with the pumping unit enclosed in the base of the machine. 71

Lewellen Units for Flexible Speed Control

The two transmission units here illustrated, made by the Lewellen Mfg. Co., 1015 E. 10th St., Columbus, Ind., are being employed to solve a particular speed control problem encountered in the operation of a very heavy machine. One unit controls the spindle speed, while the other controls the feed-screw. Both units are required to function in both vertical and horizontal positions during the operating cycle.

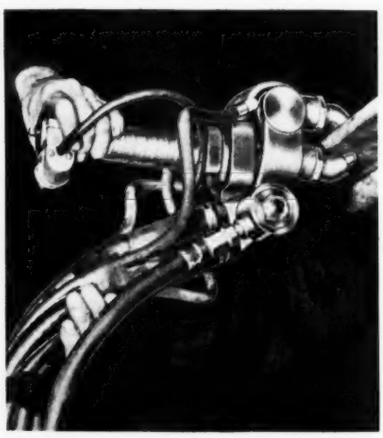
The spindle control can be set for any desired speed. When the stop-button is pressed, the spindle speed is reduced to a minimum before the motor circuit is opened. Should the machine be stopped suddenly, the spindle control will return to its slow-speed position before starting. Thus the spindle always starts at the slowest speed and then accelerates at a controlled rate to the preset speed.

Since the operation generates a certain amount of heat, the temperature of the material is increased, causing it to elongate gradually and slowly. The speed of the feed-screw is thus accelerated automatically at the correct rate to compensate for the elongation. 72

Hydraulic Cable Clamp for Spot-Welding Gun

A new hydraulic, welding-cable clamp, designed to reduce operator fatigue and increase the speed with which a welder gun can be handled, has been brought out by the Progressive Welder Co., 3024 E. Outer Drive, Detroit, Mich. The positive clamping action of this new equipment provides full current transfer, which results in more uniform welds.

The clamp is so designed that the cable and gun are locked hydraulically while the pressure is on for a weld, and the moment pressure is released, the clamp unlocks, permitting the gun to be swiveled to a different position, with little or no movement of the cable. The clamp thus assists the operator in holding the gun steady while welding. The device operates directly from the hydraulic pressure system. The clamp is made in five different sizes to accommodate the various types of sliding contact or pincer type Progressive guns. 73



Hydraulic Cable Clamp Designed to Facilitate Handling of Welding Gun

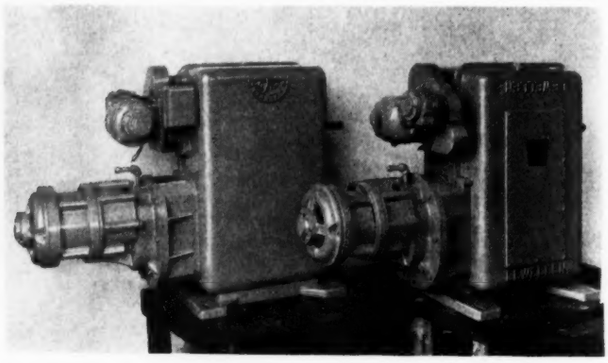
Haskins Bench Type Flexible-shaft Machine

Haskins Flexible-Shaft Machines

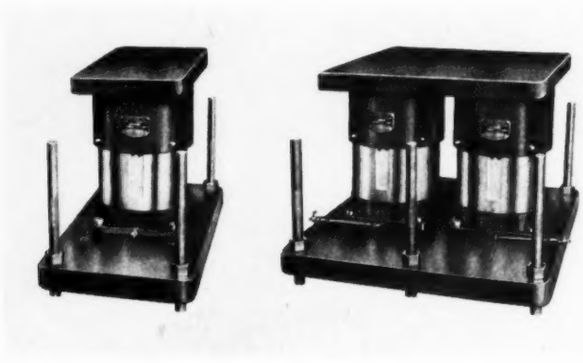
The R. G. Haskins Co., 617 S. California Ave., Chicago, Ill., is adding to its flexible-shaft equipment a bench type machine with a newly designed round base that is so proportioned for each size unit that it provides maximum stability with a minimum requirement for bench space. The motor is fastened to the base by means of a ball-bearing swivel-plate having a full 360-degree swing. This bench type unit is furnished in 1/4- and 1/2-H.P. sizes, and is arranged for either single-speed direct drive or multi-speed countershaft drive. 74

Dayton Rogers Pneumatic Die Cushion

The Dayton Rogers Mfg. Co., 2830 S. 13th Ave., Minneapolis, Minn., has developed a pneumatic die cushion of new design known as Model H. This general-utility, telescoping type die cushion is made in four sizes, and is adapted for all press applications, including inclinable presses and presses having straight sides. Multiples are used in



Two Lewellen Transmission Units Employed to Solve Speed Control Problem on Heavy Machine



Single and Double Types of Dayton-Rogers Telescoping, Pneumatic Die Cushions

To obtain additional information on equipment described on this page, see lower part of page 134.

two, four and six units, mounting plates being made to suit the press.

The telescoping cylinders make it possible to mount this type of cushion on a press without providing it with a pit. The accurate guidance of the pin pressure-pad, which is essential on most classes of work, is easily obtained by this type of cushion. This feature adapts the equipment for all press work requiring balanced pressure on the draw-ring.

Each cushion is furnished with a regulator and gage, surge tank, and all other equipment, ready for installation. When the cushions are not needed, as for instance when blanking and piercing, and when the cushion is not under air pressure, the cylinder may be bled, allowing the pin plate to drop down or retreat to the bottom position, so that blanks and slugs can drop through the free opening in the bolster plate. 75

Marking Device for Gears and Bushings

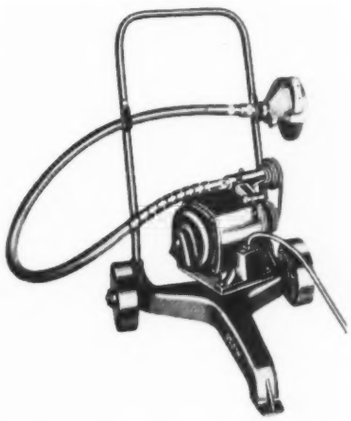
A new marking device designed for the annular marking or stamping of such parts as gears, bushings, bearings, etc., in quantity production work, has been brought out by the New Method Steel Stamp Co., 143 Jos. Campau St., Detroit, Mich. The usual set-screws required to hold movable type in place have been eliminated in this device. The type-holder consists of five basic parts—a central shaft with a flange against which a hardened and ground anvil disk is assembled; a snap-ring in a groove machined in the shaft for locating the type during assembly by means of grooves cut in the type; an outer spring-steel split sleeve which holds the type in place; and the type-holder body in which the entire assembly is carried.

To mark a part, the holder is merely placed on or against the part, with the shaft located in the bore. The end of the holder is then given a sharp blow with a hammer. 76

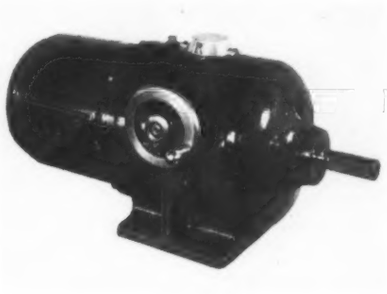
Stow Truck-Mounted Flexible-Shaft Machine

A flexible-shaft machine designed to be easily moved around factories and yards has been placed on the market by the Stow Mfg. Co., Inc., 15 Shear St., Binghamton, N. Y. It has a two-wheel truck mounting, which carries either the direct-connected motor-and-shaft unit or the multi-speed belt- and pulley-driven unit.

The truck base is of heavy cast-iron construction and is equipped with two 8-inch wheels and an extending leg arrangement to provide three-point support. A ball-bearing swivel makes it possible to easily turn the heaviest type of unit in a horizontal plane. This model is especially suitable for heavy work. 77



Stow Truck-mounted Flexible-Shaft Machine



Variable-speed Transmission Made by Lenney Machine & Mfg. Co.

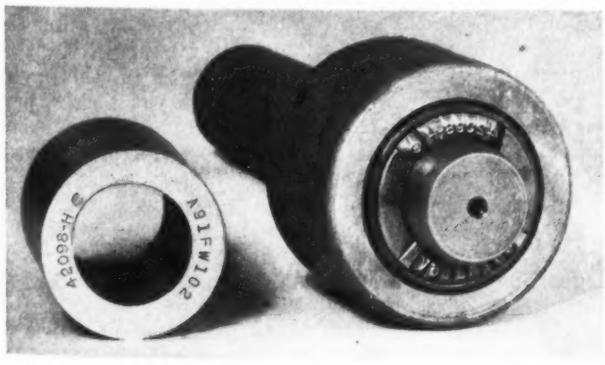
Lenney Variable-Speed Transmission

The variable-speed transmission manufactured by the Lenney Machine & Mfg. Co., 733 Niles Road, Warren, Ohio, has been extensively redesigned. The new transmission has a speed range of 225 to 925 R.P.M. when driven by a 1750-R.P.M. motor. An automatic pressure-regulating clutch of simple, rugged design is actuated by the amount of the load on the output shaft. The design has been so changed that thrust on the cross-shaft and its bearings has been eliminated.

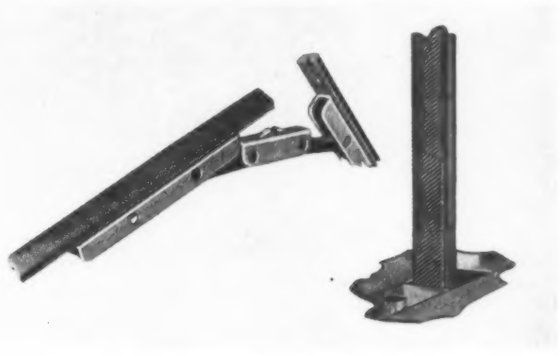
This transmission is located on top of the machine to facilitate accurate selection of speeds. Precision ball bearings are used throughout. Oil is sealed within the case, and thorough lubrication is insured by the splash system. The output end cover has been redesigned to give a streamline appearance. 78

Improved File-Chain for Grob Filing Machines

Grob Bros., Grafton, Wis., have brought out new files and file-chains of improved design for use on their



Device Made by New Method Steel Stamp Co., for Marking Gears and Bushings



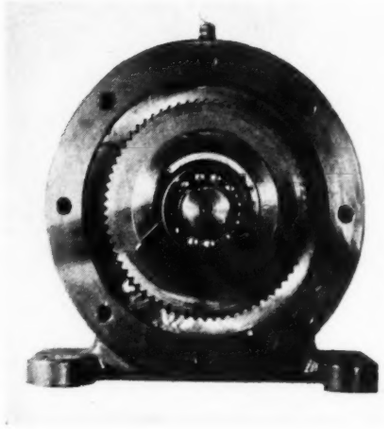
New Files and File-chain Developed for Grob Filing Machines

To obtain additional information on equipment described on this page see lower part of page 134.

continuous-motion filing machines. In order to insure smooth, clean-cutting action, the files are made extremely accurate with respect to thickness, width, and shape, and are guided in such a way that they follow each other in accurate alignment.

The ends of the new files, in addition to providing accurate alignment, also have an overlapping feature obtained by cutting the ends at an angle. The view to the left in the illustration shows the new arrangement provided for alignment of the files. The view to the right shows the files and their positions while passing through the working zone.

Small slots are milled in the ends of the files on the rear side which closely fit into projections on the chain links in back of the files. Thus as the files enter a straight-line path after leaving the pulley, they are individually and independently locked in perfect alignment. The file-chain, while in the working zone, is closely guided by its support. As the file-chain guide is made slightly deeper than the chain, chips cannot throw the files out of line or harm the equipment. 79



Speed Reducer Made by Brad Foote Gear Works

Farrel-Birmingham Hydraulic Presses for Molding Plastics

The Farrel-Birmingham Co., Inc., Ansonia, Conn., has recently built twelve 20- by 20-inch hydraulic presses like the one illustrated for use in molding small rubber and plastic articles. The streamline design of the press not only improves its appearance, but facilitates keeping the machine clean and in an orderly condition. The housing, which includes a top, bottom, and sides, is a single casting. The cylinder, made of Meehanite, is set in the base of the housing. Both the cylinder and gland are lined with bronze, and the gland studs and nuts are made of stainless steel. This construction is employed to prevent corrosion and to increase the life of the press.

This press is designed to operate at an initial water pressure of 2000 pounds per square inch, giving a total pressure of 113 tons, or 563 pounds per square inch, on the platens. It is equipped with three 20-inch square plates made of rolled steel. These plates are machined to provide a smooth finish, and are drilled to permit maximum steam circulation and uniform heating.

The steam connections for the platens consist of flexible metallic tubing which is fully enclosed in the housing and covered by sheet-metal guards. The guards can be quickly removed to give access to the platens and piping. The temperature of the platens is automatically controlled by an air-operated diaphragm valve located in an opening in the top of the press. The temperature of the platens, steam, air, and water pressure is indicated by gages mounted in a panel at the front of the press. ... 80

Hydraulic Press for Molding Plastics, Brought out by the Farrel-Birmingham Co., Inc.

Brad-Foote Speed Reducer

The Brad Foote Gear Works, 1301 S. Cicero Ave., Cicero, Ill., are placing on the market a new speed reducer of the design shown in the illustration. This compact unit provides high-ratio speed reductions without the use of large gears. In this speed reducer, a double spur or combination spur and internal gear, mounted in ball-bearings on an eccentric drive-shaft, meshes with a stationary internal gear. Either a spur or an internal gear which is integral and concentric with the output shaft is in mesh with the secondary gear. The eccentric shaft drives the initial spur gear around the pitch line of the stationary internal gear. Since the initial spur and secondary gear are in one piece, the speed of the latter is controlled by the ratio between the initial spur gear and the stationary gear.

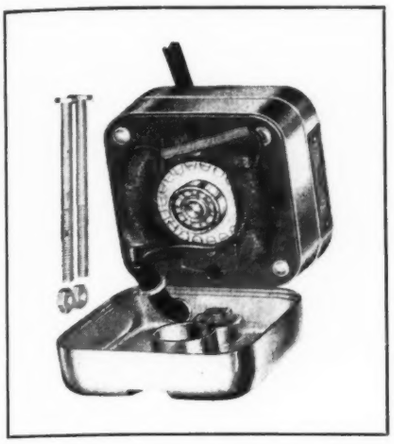
To obtain large reduction ratios, a small difference in the number of teeth between the spur gear and the internal gear is used. This means that the pitch line of the spur gear must nearly conform to that of the internal gear. Thus a larger number of teeth are engaged, increasing the load-carrying factor. The efficiency of this design ranges from 70 to 90 per cent with reduction ratios from 20 to 1 up to 7500 to 1. 81

"Metl-Hub" Scratch Brushes

A new type of scratch brush for metal-finishing work has been developed by the Hanson-Van Winkle-Munning Co., Matawan, N. J. This brush, designated the "Metl-Hub," has a one-piece, circular metal hub of light weight alloy. This hub will not warp, split, or check. The face of the hub permits the drilling of holes for the brush tufts close to the edge of the block, thus eliminating most of the projecting shoulder and lessening the danger of striking the work against the metal.

The high strength of the metal hub, compared with wood hubs, permits the use of an over-size arbor hole. This type of hub is designed to remain in accurate balance, and thus reduces power cost, vibration, and wear and tear on spindles and motors. The brushes are made in all diameters ordinarily required, and with any number of rows of tufts, as well as in a variety of hub and arbor sizes. Steel, brass, and nickel-silver wire of all sizes can be used, as well as Tampico bristle and hair tufts. 82

To obtain additional information on equipment described on this page, see lower part of page 134.



Fractional-horsepower Motor Made by Russell Electric Co.

Fractional-Horsepower Ball-Bearing Motor

The Russell Electric Co., 354 W. Huron St., Chicago, Ill., has brought out a new line of fractional-horsepower, ball-bearing and self-aligning, sleeve-bearing, shaded-pole motors which have high locked rotor and accelerating torque, in combination with high electrical efficiency and large output per unit weight. These alternating-current motors are of the four-pole design, with output ranges of from three to fifteen watts.

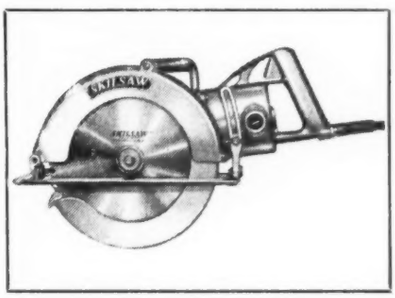
Alignment of the stator is accomplished by the use of die-cast end frames with a spacer shell held in place by through bolts. This design, as shown in the illustration, has a recess in the end frame to accommodate the spacer shell, and a second recess which serves to position and locate the stator.

The bearing housing, instead of projecting externally, is nested between the stator coils, thus securing an extremely compact motor. The design also provides a flat external end frame surface that facilitates mounting the motor on gear-boxes and other flat surfaces. The motors will operate in any position, and will withstand substantial end thrust. Self-aligning, semi oil-less sleeve bearings are also available. 83

Atlantic Grinding Wheels

A wheel especially designed for grinding welds and snagging castings has been developed by the Atlantic Abrasive Corporation, 518 Pearl St., South Braintree, Mass. This wheel, known as Type AK, makes use of the company's patented synthetic bonding material, which permits of high working speeds and pressures without danger of burning. Lower costs and better finish on the product are the results claimed for this type of wheel.

Two wheels for grinding high-speed steel and other cutting metals have also been brought out by this company. The Type LB wheel is intended for the fast, clean grinding of high-speed steel tools and dies. The Type SB wheel is a medium-tempered wheel for grinding tools made from high-speed steel, Stellite, carbides, and similar materials. It permits maximum working speed and pressure without danger of burning. 84



Portable Electric Hand Saw Made by Skilsaw, Inc.

Skilsaw Electric Hand Saw

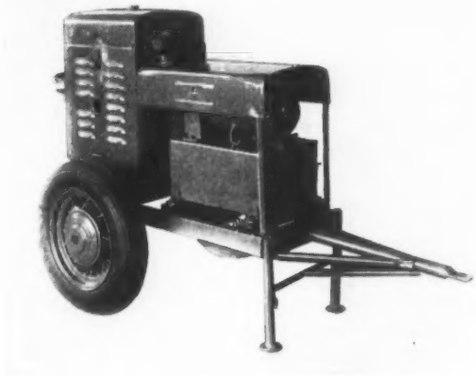
An improved portable electric saw —the Model 127—has just been added to the line made by Skilsaw, Inc., 5039 Elston Ave., Chicago, Ill. It is claimed that new features incorporated in this saw make it one of the most powerful and fastest cutting tools of its kind.

The saw blade is 12 inches in diameter, and is adapted for cutting copper sheets up to 5/8 inch thick and lead sheets 2 inches thick. It can also be used for cutting timber up to 4 inches thick, and for bevel-cutting lumber 3 5/16 inches thick at an angle of 45 degrees. The blade has a free speed of 2400 R.P.M., and is protected by an automatic spring-operated telescoping guard. 85

Comet Portable Heavy-Duty Arc Welder

The Comet Products Co., Chappaqua, N. Y., has developed an engine-driven arc welder with self-excitation, self-stabilization, and simple control features. This welder can be used continuously for mass production welding on a twenty-four hour basis without the use of any external exciter parts. The heavy-duty construction permits relatively large electrodes to be used at high average amperages without danger of burning out. Adequate marking of the controls facilitates instant selection of the heat desired.

This welder is being built in 150- and 200-ampere sizes, driven by a four-cylinder, air-cooled engine, and a 300-ampere size driven by a six-cylinder, water-cooled engine. These welders can also be furnished with Diesel engines if desired. 86



Portable Arc Welder Made by the Comet Products Co.

Work Supports with Kennametal Inserts

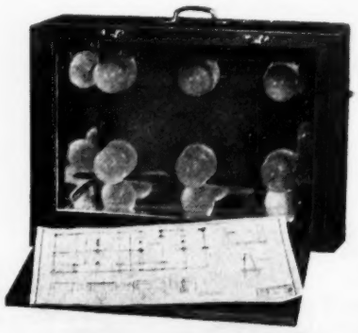
Work-rests for supporting work in machine tools and other metal-working machines, are being made with

Work Support Provided with Kennametal Insert

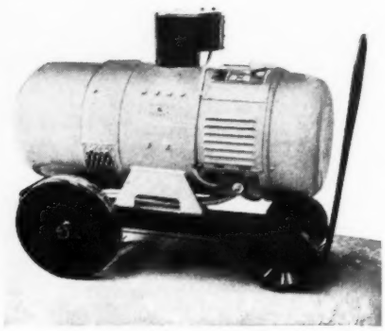
To obtain additional information on equipment described on this page, see lower part of page 134.

Kennametal inserts by the McKenna Metals Co., 147 Lloyd Ave., Latrobe, Pa. The unusual hardness of Kennametal—76 to 78 Rockwell C—insures long life for the rests and accurate positioning of the work.

These new work supports are made to specification in any length, diameter, and bore. The typical work support illustrated is used to support a pinion in an automatic screw machine. It is 1 1/2 inches long by 1/2 inch outside diameter. 87



Elpro Portable Printer, Placed on the Market by the Ozalid Corporation

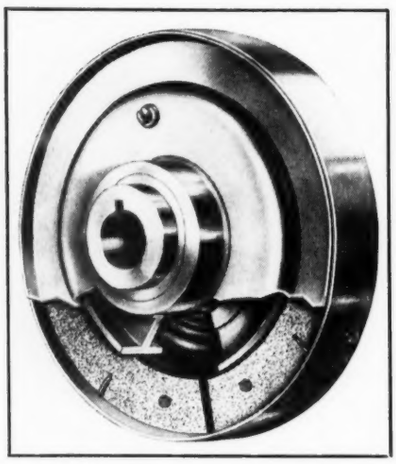


Wilson Arc Welder Equipped with Remote Control

Mercury Clutch Designed to Eliminate Shock

The Mercury Clutch Corporation, 637 W. Third St., Massillon, Ohio, has developed a clutch in which mercury is utilized in the application of centrifugal force for displacing friction segments. With this arrangement, the driving motor is allowed to gain speed and thus permit the clutch to gradually pick up the load at full speed. The clutch has only four principal parts—the driving member or housing, the driven member or inner drum, the clutch segments, and the mercury, introduced through filler holes.

In operation, the mercury displaces the clutch segments inward, so that they engage the drum at the proper time and speed, a positive drive being effected when the speed of the housing and driven drum are synchronized. With this clutch, it is possible to use smaller motors for service requiring starting under load. The Mercury clutch can also be used as an automatic brake which becomes effective at a given speed. It is made in sizes for transmitting up to 5 H.P. 88



Mercury Clutch Designed to Pick up Load without Shock

Elpro Portable Printer

A new Elpro portable printer for use either in the office or in the field has been placed on the market by the Ozalid Corporation, Ansco Road, Johnson City, N. Y. This printer is designed to use positive-printing, dry-developing Ozalid sensitized papers and cloths for reproducing, at a moment's notice, engineering drawings, letters, reports, maps, or any printed matter appearing on one side of a reasonably translucent sheet.

The light source consists of six special lamps. The case is finished in gun-metal, and a highly polished aluminum reflector assures uniform light distribution over the printing surface. A new feature is a dry developing chamber which is located behind the metal reflector, where it utilizes the heat generated by the light for vaporizing the developing agent. An additional feature is a time switch, which allows the operator to regulate the length of exposure automatically, thus eliminating guesswork. As no moist surface developing solutions are used, no washing or drying is required. 89

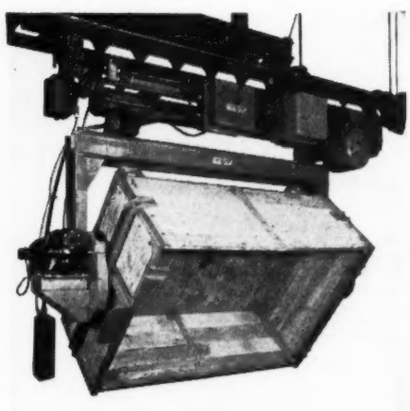
Wilson Remote Control for Arc Welder

A new device for the remote control of Wilson "Hornet" arc welders has just been placed on the market by the Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City. To utilize the new device, the handwheel that governs the control pole of the standard welder is simply replaced by the reversible motor-driven Type SC remote control device, operated by a 1/80-H.P. motor which is protected by two limit switches and a slip clutch.

With this new device, minute adjustments in the current output are obtained by merely touching the ground with one of two contacts on the electrode-holder. Thus when the electrode-holder button marked "more" is brought into contact with the ground, the electric motor in the remote control housing on top of the machine revolves and raises the control pole core, increasing the output. The motor revolves only while actual contact is maintained. When the button marked "less" is grounded, the remote control motor revolves in the opposite direction, decreasing the output. 90

Cleveland Full-Rotation Box Grab and Tramrail Carrier

The Cleveland Tramrail Division of the Cleveland Crane & Engineering Co., Wickliffe, Ohio, has developed a new full-rotation box grab and tramrail carrier which is suitable for conveying materials in a wide range of industries. The boxes can be turned to any position by means of a gear-motor drive, and



Cleveland Box Grab and Tramrail Carrier

To obtain additional information on equipment described on this page, see lower part of page 134.

even a complete turn can be made if desired. The box can be raised or lowered by the twin hoisting unit.

The unit illustrated is for boxes 48 inches wide, 72 inches long, and 30 inches deep, and will carry 2000 pounds of materials. It has a full-load hoisting speed of 20 feet per minute and a travel speed of 150 feet per minute. The push-button station is used for all operations, including turning. Grabs can be furnished for smaller and larger boxes, and for loads up to 5 tons. 91

Portable Electric Sander

The Syracuse GuildTool Co., 1720 N. Salina St., Syracuse, N. Y., has recently added to its line of portable

Portable Electric Sander Made by the Syracuse GuildTool Co.

tools a new electric sander using standard 3- by 24-inch abrasive belts. This tool has a belt speed of 1350 feet per minute, and is designed for sanding and surfacing operations on metal, wood, marble, slate, plastics, and various other materials.

It weighs fifteen pounds, and is equipped with a 1/2-H.P. universal motor for operation on a 110-volt alternating-current or direct-current line, or it can be supplied for other voltage requirements. A patented belt-aligning control insures efficient belt traction, regardless of the motion used. An easily operated latch is provided to facilitate changing belts quickly. 92

Reset Timing Relay with Cycle Progress Indicator

A fully automatic timer that can be instantly reset, known as the "Chronoflex," has been brought out by the Eagle Signal Corporation, Moline, Ill., for industrial machinery processing applications. This timer is driven by a synchronous motor, and has a single-pole, double-throw switch for external control. The switch has 3/8-inch diameter silver alloy contacts suitable for handling large loads.

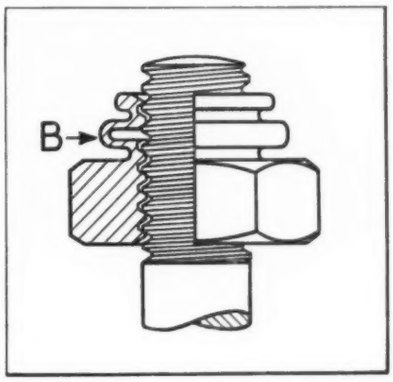
An unusual feature of the device is the large clock-face dial assembly, which shows at a glance both the finished and the unfinished portions of the time cycle. The timer has a shock absorbing device that cushions the blow delivered by the solenoid. This feature insures smooth operation for both the energizing and de-energizing strokes. Two standard models are available, one having a cycle range of from 0 to 120 seconds, and the other from 0 to 20 minutes. The device can also be furnished for special cycle ranges. 93

"Chronoflex" Automatic Timer

Self-Locking Nut

A self-locking, one-piece, all-metal nut, designed to withstand the most severe vibration without becoming loose, is being made and distributed by the Scovill Mfg. Co., Waterbury, Conn., under license of the Boots Aircraft Nut Corporation. As shown in the illustration, this nut consists essentially of two nuts in one, with the top section displaced in a downward direction, so that its upper locking threads are normally out of lead with respect to the load-carrying threads of the lower section. The two sections are connected by a spring member *B* which is an integral part of the nut.

When a bolt is inserted in the nut as shown, the spring member allows the top section of the nut to be extended to permit it to engage properly with the threads of the bolt. A force is thus established which firmly grips the nut without damaging the threads of the screw or bolt. The nut is made with standard threads and is being used extensively in the aircraft, automotive, and other industries. These self-locking nuts are now available in sizes of from No. 8 to 3/4 inch inclusive, in a variety of metals. 94



Boots Self-locking, One-piece, All-metal Nut

* * *

Blue Paste for Locating High Spots when Scraping Bearing Surfaces

To overcome the various faults found with the ordinary Prussian blue used for marking bearing surfaces when scraping, the Dykem Co., 2301 N. Eleventh St., St. Louis, Mo., has brought out an intensive blue paste known as "Dykem Hi-Spot Blue No. 107." This paste is very smooth and soft, free from grit, uniform in quality, and—most important of all—does not dry out. It is stated that a thin coating of this blue paste can be left on the master or bearing surface day in and day out without drying. The film remains "wet" and "transferable," saving the time of the scraper and facilitating his work. The Dykem blue is available in convenient tubes.

* * *

Westinghouse Employes Honored

The Westinghouse Order of Merit—a recognition of distinguished service—was conferred on thirty-nine employes of the Westinghouse Electric & Mfg. Co. during 1939. More men received this medal last year than in any single year since the inception of the order in 1935. The medal bears the name of the recipient and the legend "whom his fellow men delight to honor." The award is made to a list of employes selected from those who are nominated by their fellow employes and company executives.

To obtain additional information on equipment described on this page see lower part of page 134.

American Society of Mechanical Engineers Meets in Worcester

The national spring meeting of the American Society of Mechanical Engineers will be held at the Hotel Bancroft in Worcester, Mass., May 1 to 3. Among the papers of interest in the machine shop operation and machine building field should be mentioned those presented at the machine shop practice session. Eric Hirvonen of the Leland-Gifford Co., Worcester, will read a paper on "Deep-Hole Drilling by the Automatic Step-Drilling Method"; Victor Sepavich and Albert Palmer, in charge of research and development at the Crompton & Knowles Loom Works, Worcester, will present a paper on "High-Speed Photography and the Study of Rapid Machine Motions."

At the management session, Harold B. Bergen, industrial relations consultant with McKinsey & Co., New York City, will present a paper entitled "A Personnel Program for a Small Plant," while C. R. Dooley, manager of industrial relations, Socony-Vacuum Oil Co., New York City, will discuss "Merit Rating of Employes."

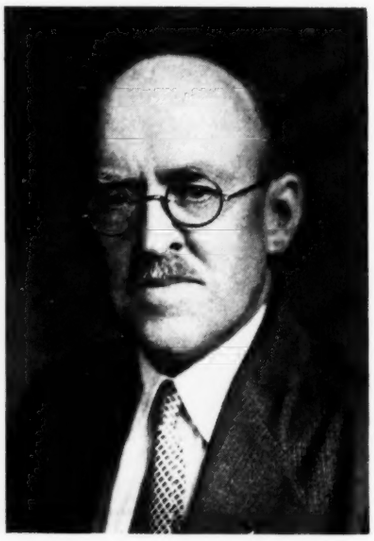
At another session, to be held at the plant of the Worcester Pressed Steel Co., three papers of interest in the metal-working industries will be read: "The Forge of Vulcan" by John W. Higgins, president, Worcester Pressed Steel Co.; "The Aluminum Alloy Aircraft Dome," by Harold T. Burke, chief tool designer, Worcester Pressed Steel Co.; and "The Pressed Steel Industry," by Carter C. Higgins, sales engineer, Worcester Pressed Steel Co.

At the materials-handling session, A. L. Wilkinson, of the Leland-Gifford Co., will read a paper on "Machine Tool Transfer Methods," and Russell Hastings, of the Lewis-Shepard Sales Corporation, Watertown, Mass., will deal with "Some New Types of Materials-Handling Equipment."

Among other papers to be read before the meeting are: "Factors in the Fatigue of Helical Springs," by R. R. Tatnall, metallurgical engineer, Wickwire Spencer Steel Co., Worcester; and "Combined Tension-Torsion Tests on 0.35 Carbon Steel," by Evan A. Davis, Westinghouse Electric & Mfg. Co., South Philadelphia, Pa.

At the luncheon to be held on Wednesday, May 1, at the Bancroft Hotel, William A. Bennett, Mayor of Worcester, will welcome the members of the Society. The chief speaker at the luncheon will be Dr. John F. Tinsley, president of the Associated Industries of Massachusetts and president and general manager of the Crompton & Knowles Loom Works. At the dinner to be held Thursday evening, May 2, Ralph E. Flanders, past-president of the Society, and president of the Jones & Lamson Machine Co., will be the principal speaker, his subject being "The Progress Report of an Amateur Economist."

In addition to the technical sessions, the members taking part in the meeting will have the opportunity of visiting a large number of outstanding industrial plants in Worcester, including the plants of the Norton Co., the Rockwood Sprinkler Co., the Worcester Pressed Steel Co., the Alden Hydraulic Laboratory, the Simonds Saw & Steel Co. (Fitchburg, Mass.), the Crompton & Knowles Loom Works, the Leland-Gifford Co., the Baldwin-Duckworth Chain Co., and the Wyman-Gordon Co.



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Ralph E. Flanders, Past-president of the A.S.M.E. who will Deliver the Principal Address at the Banquet of the Society in Worcester

* * *

During the first three months of 1940, awards made to employes through the General Electric Co.'s suggestion system for ideas relating to the employes' daily work, amounted to $17,587, compared with $13,461 for the same period last year.

National Metal Exposition

The 1940 National Metal Congress and Exposition will be held in the Public Auditorium, Cleveland, Ohio, during the week beginning October 21. Already space reservations have been made exceeding the entire space occupied by the exhibits at the Chicago Metal Exposition last year. The Show is held under the auspices of the American Society for Metals, 7301 Euclid Ave., Cleveland. Seventy-five thousand square feet of space had been set aside for the Exposition, but on April 6 requests for 86,000 square feet of space had been received. The space available in the Public Auditorium—up to 150,000 square feet—is, however, ample to take care of any requirements.

The heavy advance requests for space indicate that there is increased business confidence and a satisfactory future outlook.

* * *

Duplicator Mounted on Reed-Prentice Machine

On page 186, April MACHINERY, a Detroit Universal duplicator was described. In the illustration accompanying the article, the duplicator was shown mounted on a vertical milling machine. It should have been mentioned that this machine was a 3VS vertical milling machine built by the Reed-Prentice Corporation, Worcester, Mass.

* * *

Resistance Welding Prize Contest

The Resistance Welder Manufacturers Association has announced a prize contest for technical papers on any subject pertaining to resistance welding. The papers must be submitted on or before August 31, this year. The contest is open to any person living in the United States or Canada, and also to any member of the American Welding Society who may reside outside of the United States or Canada. Seven prizes are offered ranging from $25 to $300. All papers are to be submitted to the American Welding Society, 33 W. 39th St., New York City, from whom further information can be obtained. The rules governing the contest can also be obtained from the Resistance Welder Manufacturers Association, 505 Arch St., Philadelphia, Pa.

NEWS OF THE INDUSTRY

Illinois and Missouri

GEORGE S. MAY BUSINESS FOUNDATION, 111 S. Dearborn St., Chicago, Ill., has been organized to do research work for private business enterprises. The organization is planning to fill the need for a scientific, fact-finding body to study the problems that confront business management in its efforts to earn profits under present conditions.

HAYES PARSONS has been appointed sales manager of the Link-Belt Speeder Corporation, 301 W. Pershing Road, Chicago, Ill., manufacturer of cranes, shovels, and drag lines.

EDWIN S. PILLSBURY, president of the Century Electric Co., St. Louis, Mo., was honored recently by being presented with one of the Modern Pioneer Awards for his outstanding contributions to industrial progress through invention and research in the electric motor field.

JANETTE MFG. CO., 556-558 W. Monroe St., Chicago, Ill., has appointed A. R. NIEMOELLER, 5817 Itaska St., St. Louis, Mo., sales and service representative in that territory.

Michigan

PROGRESSIVE WELDER CO., Detroit, Mich., has just begun production in its new factory at East Outer Drive. The new plant, of strictly modern design and layout, has the greater portion of its 30,000 square feet of floor space divided into three main departments for manufacturing automatic spot-welding equipment, hydraulic punching and riveting equipment, and portable spot-welding equipment, respectively.

CECIL M. KNIGHTS has been appointed manager of the Detroit office of the Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturer of electroplating equipment and supplies. Mr. Knights has spent practically all his life in the electroplating field. He has been salesman with the Hanson-Van Winkle-Munning Co. in the Chicago territory since 1929.

DONNELLY PATTERN & ENGINEERING CO. has awarded a contract to the Austin Co. for the construction of a new plant at Braden and Michigan Aves., Detroit, Mich. The development will represent an investment of approximately $100,000 for plant and equipment. The new plant will be devoted to an entirely new line of manufacture developed by the company.

LOUIS M. BENKERT, who has been associated with the Progressive Welder Co., Detroit, Mich., manufacturer of spot-welding and hydraulic punching equipment, since its organization in 1935, has been made general manager of the company. Prior to becoming connected with the Progressive Welder Co., Mr. Benkert was employed by one of the large automobile manufacturing plants in Detroit in connection with welding operations. Since he has been with the Progressive Welder Co., he has had charge successively of the service, engineering, estimating, and sales departments.

Louis M. Benkert, New General Manager of the Progressive Welder Co.

DOW CHEMICAL CO. plans the construction of a large rolling mill at Midland, Mich. The building and equipment will cost in the neighborhood of $500,000, and will increase the capacity of the production of Dowmetal in sheet form at least 50 per cent. The new project will be a one-story factory type building, 300 by 100 feet.

NATIONAL PRODUCTION CO., 4561 St. Jean Ave., Detroit, Mich., announces that the "Safe-Line" wire rope clamp made by the company has been approved by the Underwriters' Laboratories, Inc., for use on wire ropes for the most exacting service. Exhaustive tests were undertaken by the Laboratories before this approval was given.

New York and New Jersey

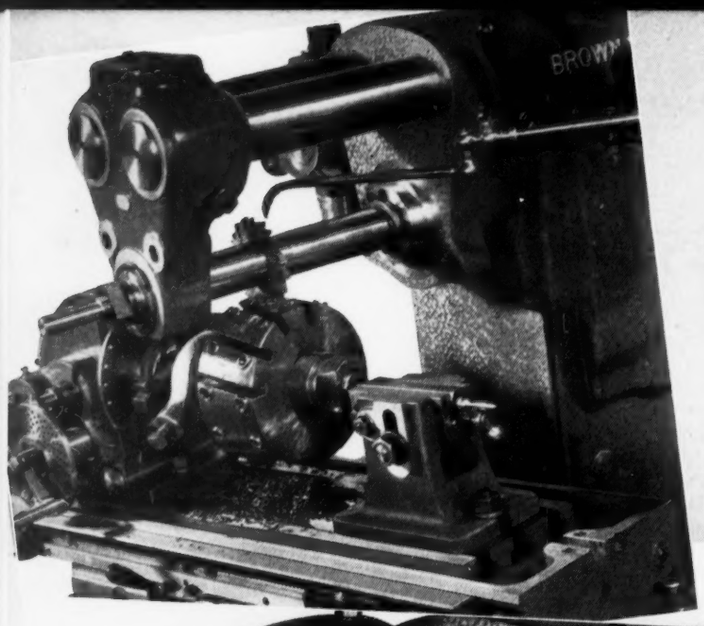
OAKITE PRODUCTS, INC., 22 Thames St., New York City, held its annual spring technical sales conference of the Northeastern and Philadelphia Divisions in New York City, April 4 and 5. Forty Oakite field service representatives met with members of the company's technical and service staffs in a two-day session. Two recent developments of special interest to the metal-working industries were emphasized. One was Oakite soluble oil developed for cutting, grinding, and other machining operations; the other was Oakite pickle control, a soluble, non-foaming type of inhibitor, which is said to reduce hydrogen embrittlement and provide other advantages in production pickling operations.

STOW MFG. CO., INC., Binghamton, N. Y., has appointed the following distributors: CAREY MACHINERY & SUPPLY CO., 119 E. Lombard St., Baltimore, Md.; CANADIAN FAIRBANKS-MORSE CO., LTD., 980 St. Antoine St., Montreal, Quebec, Canada; COLONIAL SUPPLY CO., 217 Water St., Pittsburgh, Pa.; THE BITTENBENDER CO., 126 Franklin Ave., Scranton, Pa.; NATIONAL SUPPLY CO., Toledo, Ohio; BANKS-MILLER SUPPLY CO., Huntington, W. Va.; MAU-SHERWOOD SUPPLY CO., 800 Lime Road, Cleveland, Ohio; and C. H. GOSIGER MACHINERY CO., Bacon and McDonough Sts., Cleveland, Ohio.

AMERICAN BRAKE SHOE & FOUNDRY CO., 230 Park Ave., New York City, has announced the purchase of the GREAT LAKES FORGE CO., Chicago, Ill., which operates board and steam hammer equipment varying in falling weight from 1200 to 10,000 pounds. The Forge Division of the American Brake Shoe & Foundry Co., which will operate the Great Lakes Forge Co., specializes in upset forgings. The addition of the Great Lakes Forge Co.'s plant to the present facilities of the Forge Division brings the combined forging production capacity to over 50,000 tons annually.

CLARENCE E. DAVIES, secretary of the American Society of Mechanical Engineers, has been elected president of the Newcomen Society, an international organization devoted to the history of engineering and technology. He is the first American to be president of the Society, which was founded in 1920 and named after Thomas Newcomen, inventor of the first practical steam engine. The Society is managed by a council which meets in London, but has twenty-nine regional committees functioning in the United States and Canada.

HENRY BOOTH, vice-president of the Shawinigan Products Corporation of New York, was elected president of the International Acetylene Association at the recent annual convention of the Association in Milwaukee, Wis. E. L. MILLS, vice-president of the Bastian-



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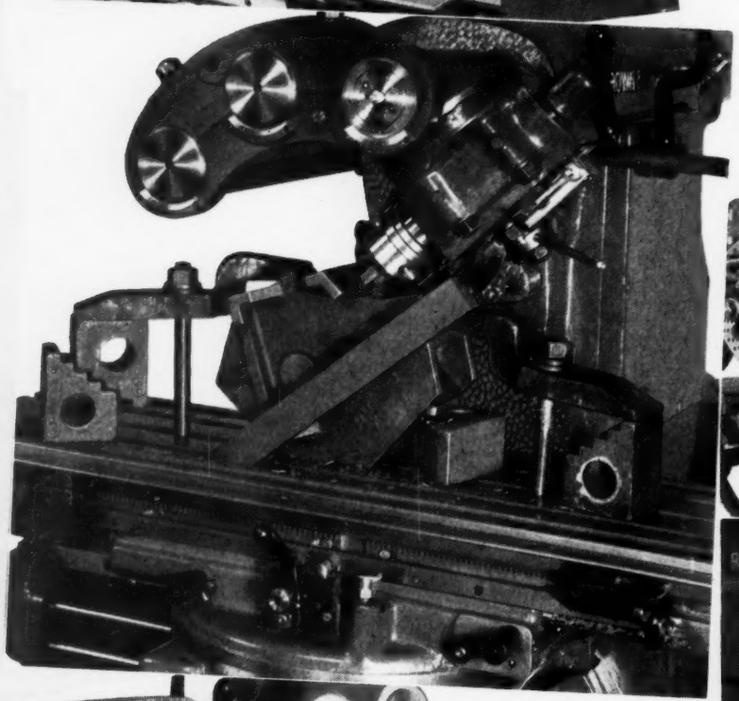

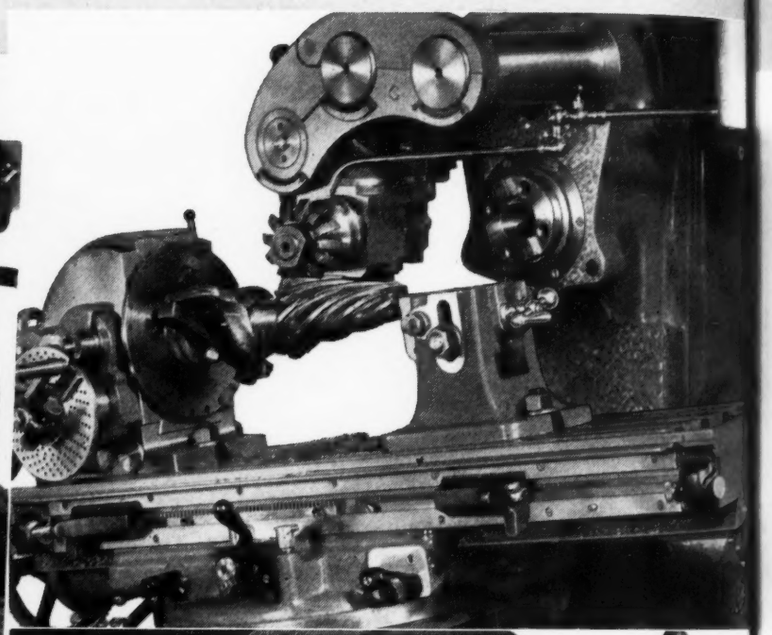

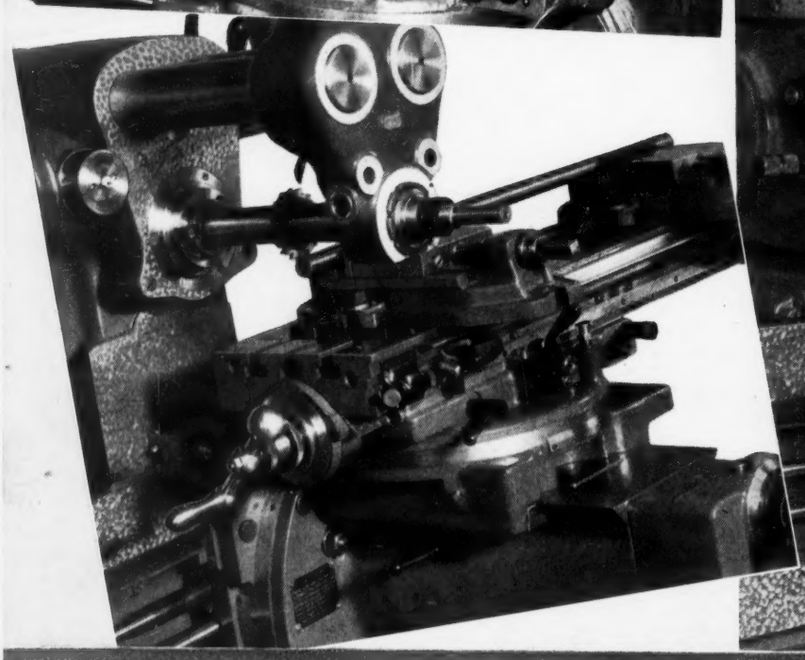

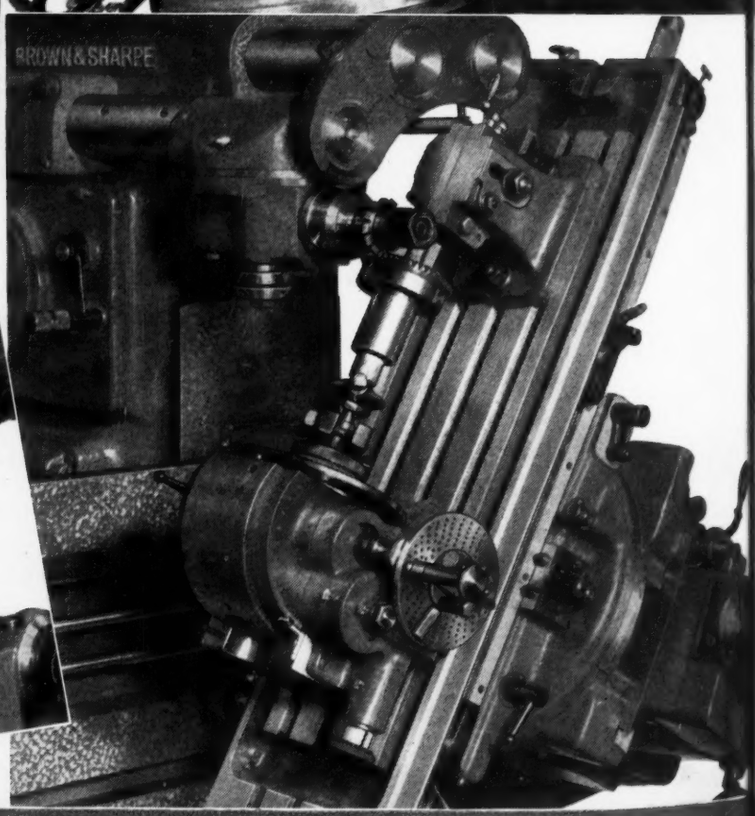

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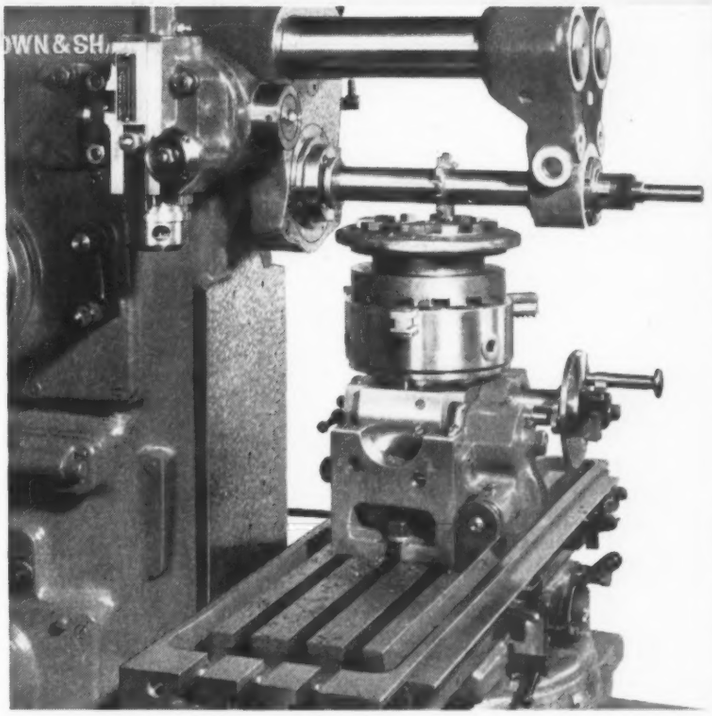

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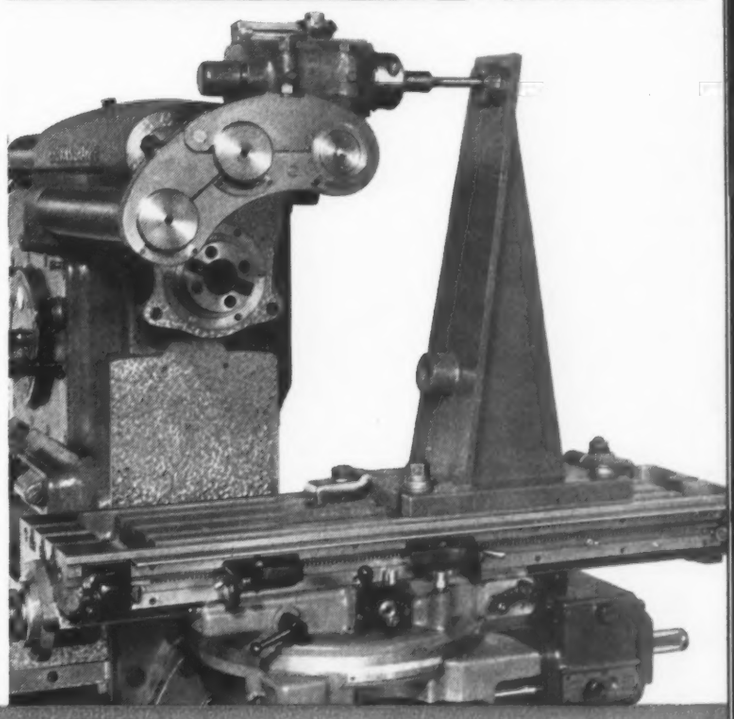
- — Omniversal Milling Head
- — Swivelling Knee
- — Horizontal Feed of Entire Knee Assembly

Simplified set-ups eliminate special holding devices. Several operations can be completed without relocating work on table.



Angular settings in all planes to 2 minutes of arc—15" vertical adjustment—34" longitudinal feed—widely adjustable position of Omniversal Milling Head — and many other features fully described in Specifications. Write for your copy. Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.

B·S

SHARPE

Blessing Co., Chicago, Ill., was elected vice-president, and PHILIP KEARNY, founder and president of the K-G Welding and Cutting Co. of New York, was elected treasurer. H. F. REINHARD, of the Union Carbide Co., New York City, was re-elected secretary.

JOHN J. CROWE, formerly manager of the Apparatus Research and Development Department of the Air Reduction Co., 60 E. 42nd St., New York City, has been appointed assistant to Herman Van Fleet, vice-president and operating manager. H. E. LANDIS, JR., formerly assistant to Mr. Crowe, will take his place as manager of the Apparatus Research and Development Department. C. G. ANDREW has been appointed manager of gas plants.

F. L. LAQUE, assistant director of technical service on mill products in New York for the International Nickel Co., Inc., 67 Wall St., New York City, is now engaged in development activities on all applications of both ferrous and non-ferrous nickel alloys. WILLIAM A. MUDGE, formerly works metallurgist of the company's rolling mill at Huntington, W. Va., will succeed Mr. LaQue as assistant director of technical service.

PHIL CARROLL, JR., one of the partners of Dyer Engineers, Cleveland, Ohio, and operating vice-president of the company, has resigned to establish his own practice as a business consultant, in collaboration with Minster & Co., 115 Broadway, New York City. Mr. Carroll has specialized in the many phases of cost control for twenty years, and is the author of a book "Time Study for Cost Control."

JESSOP STEEL CO., Washington, Pa., manufacturer of special and alloy steels, has established an export office at 2 Rector St., New York City, to facilitate the handling of its foreign trade. R. M. PAXTON, JR., has been appointed manager of the new export office and will also remain in charge of the domestic business at the same address.

R. M. Paxton, Jr., Manager of the Export Office of the Jessop Steel Co.

GENERAL ELECTRIC CO., Schenectady, N. Y., announces that the Plastic Department of the company has established a new sales office in Rochester, N. Y., under the direction of A. G. DAVIDSON, JR. For the last three years, Mr. Davidson has been located in the Meriden, Conn., office of the department.

MOREY MACHINERY CO., INC., and H. NEIL PALMER, 410 Broome St., New York City, have been appointed sole selling agents for the surplus machine tools and manufacturing equipment of Reo Motors, Inc., Lansing, Mich. An inventory of this equipment is available to those interested.

DAVID C. PRINCE, since 1931 chief engineer of the switchgear department of the General Electric Co., Schenectady, N. Y., has been made manager of the commercial engineering department, succeeding the late vice-president, E. W. Allen.

F. J. STOKES MACHINE CO. has moved its molding equipment office from 150 Nassau St. to 103 Park Ave., New York City. A. C. WIEBE is the company's molding equipment representative for the metropolitan district.

JOHN V. JIRASEK has joined the Worthington Pump & Machinery Corporation, Harrison, N. J., as special representative in the petroleum and chemical industries. Mr. Jirasek is a graduate in chemical engineering of the University of Prague. A citizen of the United States, he has been engaged, for the last twenty years, in research and development work both in the United States and Europe.

New England

GIEBEL MACHINE TOOL CO., INC., 250 W. 57th St., New York City, has moved the office formerly maintained in Hartford, Conn., to 152 Temple St., New Haven, Conn., where J. A. GRAHAM and S. J. WILLIAMSON, Connecticut representatives, will make their headquarters.

J-B SALES ENGINEERING CO., New Haven, Conn., has been appointed engineering representative in the Connecticut territory for the Worm Gear Division of the De Laval Steam Turbine Co., Trenton, N. J.

William W. Anderson, Sales Manager of the Nicholson File Co.

Wallace L. Pond, New Director of Sales of Nicholson File Co.

NICHOLSON FILE CO., Providence, R. I., has appointed WALLACE L. POND director of sales, and WILLIAM W. ANDERSON sales manager. Mr. Pond has been with the company since 1895, and has served as domestic sales manager for many years. He will continue to head the sales organization, and will give much of his attention to the study of general sales problems and sales research. Mr. Anderson has been with the company since 1919. For the last five years he has served as sales manager for the Dominion of Canada. He will have active supervision of all the sales representatives.

Ohio

FREDERICK R. SCHAEFER has been placed in charge of pressed-steel operations for the Republic Steel Corporation, Cleveland, Ohio, and its subsidiaries. Mr. Schaefer, who has been general manager of the Niles Steel Products Division, will continue to have jurisdiction over that division, as well as over the Superior Division at Elyria, Ohio, and will also serve as general manager of the Pressed Steel Division of the Truscon Steel Co. at Cleveland, the position previously held by HARRY WOODHEAD, who has resigned to become president of the Aviation Mfg. Corporation. FRANK A. GARVEY, assistant superintendent of the Union Drawn Division of the corporation, has been promoted to the position of superintendent. WALTER C. GUMPF, formerly assistant service manager, has become assistant superintendent. HARRY L. WILLIAMS has been promoted from the planning department to the position of assistant service manager, succeeding Mr. Gumpf.

HYDRAULIC PRESS MFG. CO. has awarded a contract to the Austin Co. for the design and construction of a new plant at Mount Gilead, Ohio, which will be 400 feet long and will have a total area of 50,000 square feet. The development will represent an investment of approximately $500,000 for building and equipment, and will occupy a sixty-acre site. The new plant will be devoted exclusively to the manufacture of the company's line of H-P-M "Fastraverse" hydraulic

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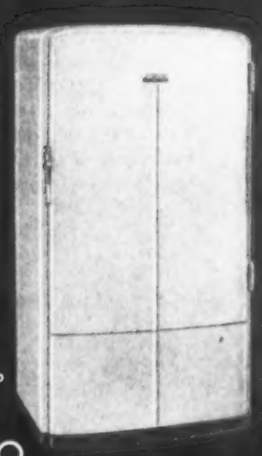

GIBSON REFRIGERATOR CORP. PHOTO

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

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presses. The existing plant will be operated independently for producing hydraulic power and control apparatus used for operating the presses and many other types of hydraulically driven machines, as well as other standardized lines of hydraulic products. It is expected that the new plant will be completed in August.

RALPH W. BAKER has been appointed assistant to the president of the Flood Co., Cleveland, Ohio, manufacturer of protective priming materials. He will coordinate the technical services and sales work of the company. Mr. Baker is a graduate of Lehigh University in chemical engineering and has a master's degree in metallurgy from Yale University. Since 1929, he has been with the Republic Steel Corporation as research metallurgist and sales engineer. He is chairman of the Committee on Methods of Corrosion Testing of the American Society for Testing Materials.

METAL STAMPING & MFG. CO., 16816 Waterloo Road, Cleveland, Ohio, announces that the firm name has been changed to MORRISON PRODUCTS, INC. No change has been made in directors, stockholders, or personnel, the name having been changed merely because it was thought that the former name did not accurately represent the activities of the company. In addition to manufacturing stampings and assemblies, the company manufactures "Airstream" blowers for the air-conditioning industry; drawn-steel guards for portable tools and bench grinders; drawn-steel pulleys for V-belt drives; and automobile replacement parts.

CINCINNATI MILLING MACHINE CO., Cincinnati, Ohio, has let contracts for the construction of a new foundry at Oakley, Cincinnati, adjacent to the company's Plant No. 2. The plans call for the completion of the building by October 1, and for the installation of equipment by November 1. The new building will be 400 feet wide by 660 feet long and will have approximately six acres of floor space. It will house both foundry and welding shop. Adjoining the foundry proper will be the pattern shop and pattern storage.

JAMES W. COREY, since 1932 general sales manager of the Reliance Electric & Engineering Co., Cleveland, Ohio, has been elected vice-president in charge of sales. Mr. Corey became connected with the engineering department of the company in 1911. He was transferred to the sales department in 1916, and in 1927 was made assistant sales manager, five years later becoming general sales manager. In 1935, he was elected a director of the company.

WARNER & SWASEY CO., Cleveland, Ohio, manufacturer of turret lathes, has added approximately 30,000 square feet to the company's plant. Since last September the capacity of the plant has been increased by one-third through the installation of new equipment and a three-shift operating schedule. The new addition will represent a 15 per cent increase over today's capacity.

HISEY-WOLF MACHINE CO., 2745 Colerain Ave., Cincinnati, Ohio, has been acquired by LOUIS GOLDSMITH, of Cincinnati, from JOHN W. FRIEDLANDER and CARL I. FRIEDLANDER, co-executors of the estate of WALTER J. FRIEDLANDER. The company, which has been in business for the last forty-five years, manufactures electric grinders, buffers, and drills. It will continue to operate under the same name as formerly.

FEDERAL MACHINE & WELDER CO., Warren, Ohio, is erecting a new engineering building with approximately 8000 square feet of floor space. Part of the building will be used for engineering offices and the remainder for research and metallurgical laboratories. The building is expected to be ready for occupancy about May 15.

YALE D. HILLS has been appointed assistant general manager of the Service-Sales Division of the Timken Roller Bearing Co., Canton, Ohio. J. F. CORNELL, branch manager of the Minneapolis branch of the Service-Sales Division, has been made special representative of the company, with headquarters at Canton.

FERRIS M. ANGEVIN, secretary of the Cincinnati Milling Machine Co., Cincinnati, Ohio, has been elected a member of the company's board of directors.

Pennsylvania

EDWARD J. CHARLTON has been appointed general manager of Lukenweld, Inc., Coatesville, Pa. Mr. Charlton has been design engineer with the company since 1931. ROBERT L. BUNTING, who has been assistant shop superintendent since 1936, has been promoted to the position of superintendent. GEORGE L. SNYDER, who, since 1937, has been assistant chief engineer, has been made chief engineer. D. BRUCE JOHNSTON, who has been engaged in experimental development and research work with the company since 1935, has been appointed manager of development and research. ROBERT B. NIVISON, who for the past year has been night superintendent, has been made chief of inspection. ROBERT C. SAHLIN has been appointed assistant manager of sales; S. NELSON BUELL, assistant chief engineer; FRED W. FORBES, assistant superintendent; W. J. MCALPINE, general foreman; and GEORGE WHEATLEY, methods engineer.

DAVID E. JACKMAN, treasurer of the Firth-Sterling Steel Co., McKeesport, Pa., since 1911, has retired from that position, but continues to serve as a director of the company. Mr. Jackman, who is now seventy-eight years old, was, previous to his association with the Firth-Sterling Steel Co., treasurer of the Westinghouse Machine Co. before it became a part of the Westinghouse Electric & Mfg. Co. He also held the office of treasurer of the Pittsburgh & Montana Copper Co. at the time it was absorbed by the East Butte Copper Co. H. R. HUEMME, formerly assistant treasurer, has been elected treasurer.

LAWRENCE E. SCRANNAGE has been appointed general manager in charge of sales and operations of the Forging Division of the Phoenix Mfg. Co., at Catasauqua, Pa. Mr. Scrannage attended the Massachusetts Institute of Technology, and later was in the employ of the Remington Arms & Ammunition Co., Scovill Wellington Co., Sheldon Axle Works, Willys-Overland Co., Toledo Machine & Tool Co., and Cleveland Hardware & Forging Co.

C. N. KIRKPATRICK has been elected vice-president and general manager of the Landis Machine Co., Inc., Waynesboro, Pa., manufacturer of thread cutting machines and die-heads. Mr. Kirkpatrick was formerly vice-president in charge of sales and also secretary of the company. J. H. ELLIOTT, purchasing agent of the company, has been elected secretary to succeed Mr. Kirkpatrick. Mr. Elliott will continue to fill his duties as purchasing agent.

COLONEL JAMES G. COWLING has been appointed special representative of the Allegheny Ludlum Steel Corporation, Pittsburgh, Pa., in its relations with the Federal Government Agencies. Colonel Cowling was formerly associated with the N.R.A., and upon the conclusion of his work with that agency, he went into business for himself in Washington under the name of James G. Cowling & Co., representing nationally known companies in Washington. His office is located at 1001 Fifteenth St. N.W., Washington, D. C.

JESSOP STEEL CO., Washington, Pa., manufacturer of special and alloy steels, announces the completion of a new building in which electroplating and arc-welding equipment used in the production of composite steels will be installed. The new building is constructed of Robertson sheet metal which has an aluminum finish on the inside to provide a high degree of lighting.

ARCHIE CHANDLER has been elected vice-president in charge of sales of the American Pulley Co., Philadelphia, Pa., manufacturer of power transmission specialties, pressed-steel material-handling equipment, and pressed-steel hand trucks. Mr. Chandler was previously general sales manager of the company.

MCKENNA METALS CO., Latrobe, Pa., manufacturer of Kennametal cutting tools and blanks, has awarded a contract for the construction of a new re-

search laboratory adjacent to its present plant. The building will be of steel construction and will be provided with the most modern laboratory equipment.

RUSSELL M. ALLEN has been appointed general manager of sales for the Allegheny Ludlum Steel Corporation, Pittsburgh, Pa. Mr. Allen, previous to his present appointment, was assistant to the president. He will make his headquarters at the general offices of the corporation in Pittsburgh.

Photo Blank & Stoller

Russell M. Allen, New General Manager of Sales for the Allegheny Ludlum Steel Corp.

ALUMINUM CO. OF AMERICA, Pittsburgh, Pa., announces that the new plant of the company now being built at Vancouver, Wash., will be doubled in capacity, so that it can produce 60,000,000 pounds of aluminum per year instead of the 30,000,000 pounds contemplated when the plans were first made.

W. J. HARRADINE has been elected a director of the Keystone Driller Co., Beaver Falls, Pa. He also becomes vice-president and general manager. The company, which has recently been reorganized, is engaged in the manufacture of well drills, power excavators and water pumps.

DAVID T. MARVEL, formerly manager of tube sales for the Timken Steel and Tube Division of the Timken Roller Bearing Co., Canton, Ohio, has joined the National Tube Co.'s sales organization in the capacity of assistant manager of sales, Ellwood Sales Division, Ellwood City, Pa.

CLEVELAND TRAMRAIL ERIE CO., distributor in Erie, Pa., and surrounding territory for Cleveland Tramrail overhead materials-handling equipment, has moved to 1731 Oxford St., Erie. H. M. NELSON is manager of this office.

T. S. FITCH, manager of the Composite Steel Division of the Jessop Steel Co., Washington, Pa., delivered a talk on "Composite Steels" at the meeting of the Dayton Chapter of the American Society for Metals on April 10.

EDGAR C. THOMAS, sales engineer for the Thomas Machine Mfg. Co., Pittsburgh, Pa., has established an eastern district sales office in the Commercial Trust Bldg., Philadelphia, Pa.

Texas

PEDEN IRON AND STEEL CO., Houston, Tex., has been appointed representative in the Texas territory for the Barber-Colman Co., Rockford, Ill., and will handle the sale of the entire Barber-Colman line of hobbing machines, hob, cutter, and reamer sharpening machines, hobs, milling cutters, and reamers.

F. E. DOTY, Box 632, Houston, Tex., has been placed in charge of the Houston territory for the McKenna Metals Co., Latrobe, Pa. C. W. MOORE has been placed in charge of the Atlanta, Ga., office of the company, located at 1545 Westwood Ave., S.W.

E. F. MEYER has been placed in charge of the Houston, Tex., territory of Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee, Wis., manufacturer of electric safety switches and motor control.

Wisconsin and Minnesota

OTTO C. VOSS, Milwaukee, Wis., was awarded the James Turner Morehead Medal, sponsored by the International Acetylene Association, at the fortieth annual convention, on April 10, in Milwaukee. Mr. Voss is advisory superintendent of the tank and plate shop of the Allis-Chalmers Mfg. Co. In recognition of his work in the oxy-acetylene field, he was given this award "for continuous pioneering, untiring educational effort, and constructive sponsorship of oxy-acetylene process applications."

FALK CORPORATION, Milwaukee, Wis., announces that EDWARD P. CONNELL, treasurer, has assumed the newly created position of general manager; WALTER L. SCHNEIDER succeeds MATTHEW A. CARPENTER as sales manager in charge of active sales of all Falk products except those covered by the Foundry Division. Mr. Carpenter, secretary of the corporation, will continue to be connected with the sales, sales promotion, and advertising departments in a supervisory capacity.

THOMAS E. COCKER has been appointed manager of the Detroit district office of the Chain Belt Co., Milwaukee, Wis., succeeding G. A. GUNTHER. MR. KLEMME will succeed Mr. Cocker as manager of the Buffalo district office. ROBERT POTTER, a member of the home office sales organization at Milwaukee, has been transferred to the Pittsburgh office.

D. S. KERR has been appointed manager of the Atlanta office of the Allis-Chalmers Mfg. Co., Milwaukee, Wis. Mr. Kerr, a graduate of Purdue University, has been in the company's employ since 1922.

OHIO GEAR CO., Cleveland, Ohio, has appointed the INDUSTRIAL SUPPLY CO., 537 S. Seventh St., Minneapolis, Minn., distributor of Ohio gear products throughout the state of Minnesota and the Northwest.

OBITUARIES

AUSTEN FOX BEAM, one of the organizers of Elk Tools, Inc., New York City, and treasurer and sales manager of the company, died on March 7 in Brooklyn, at the age of fifty-five years. Mr. Beam had been active in the automotive industry since 1906, when he became associated with the Stoddard Dayton Co. and later with the Marmon Co. He organized the Simons Sales Co., sole distributor of Overland and Willys-Knight cars for the state of Michigan. In 1924, this company moved to Brooklyn, where it was sole distributor for Chrysler cars. In more recent years, Mr. Beam was a distributor for Packard cars in Newark. In 1939, in association with J. G. Elkin, he formed Elk Tools, Inc., 33 W. 60th St., New York City, for the manufacture and distribution of universal toolholders.

LOYD E. SHIRLEY, vice-president and general manager of the C. S. Bell Co., Hillsboro, Ohio, died in that city March 12 after a six weeks illness, at the age of sixty years. Mr. Shirley's first executive position in manufacturing was assistant superintendent of the Link-Belt Co., Chicago, Ill. Later he was superintendent of the Standard Scale & Foundry Co., Kansas City, Mo., and of the Hoosier Division of the International Seeding Machine Co., Richmond, Ind. He had been with the C. S. Bell Co., first as superintendent and later as vice-president and general manager, for the last thirty-two years.

PERCY H. BIGGS, who, during the last World War, was well known in the machinery industries, died in Cleveland, on March 25, at the age of sixty-four years. Mr. Biggs was born in Cincinnati; and after having acquired experience in the machinery industries while working for several Cincinnati concerns, he went to Cleveland, where he became district manager for Manning, Maxwell & Moore.

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In 1914, he resigned from that company to form the Biggs-Waterson Machinery Co. which, during the war, became an active factor in the machinery business, with offices in Cleveland, Dayton, and Detroit.

A. WHITON VENNEMA, mechanical superintendent of the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., died at his home in Ridgewood, N. J., on March 23, in his fifty-third year. Mr. Vennema was born on May 13, 1887, in Kalamazoo, Mich. He graduated from Stevens Institute of Technology in 1909, with the degree of mechanical engineer. Mr. Vennema had been associated with the Manhattan Rubber organization for thirty-one years, and was appointed mechanical engineer in charge of maintenance ten years ago. He is survived by his wife and two sons.

N. A. STRAND, one of the partners of N. A. Strand & Co., Chicago, Ill., manufacturers of flexible shafts and machines, died at his home in Evanston, Ill., on April 10 following a long illness. Mr. Strand had not been actively engaged in business for several years, on account of illness.

ALEXANDER GIBSON, machine tool salesman in the Cleveland office of the Brown & Sharpe Mfg. Co. since the opening of that office in 1929, died suddenly on March 20 in Cincinnati, at the age of forty-one years.

COMING EVENTS

MAY 1-3—National spring meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Hotel Bancroft, Worcester, Mass. Clarence E. Davies, secretary, 29 W. 39th St., New York City.

MAY 6-8—MACHINE TOOL ELECTRIFICATION FORUM, to be held under the sponsorship of the Westinghouse Electric & Mfg. Co. at the company's plant at East Pittsburgh, Pa. For further information, address Hendley N. Blackmon, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

MAY 6-10—Convention and exhibition of the AMERICAN FOUNDRYMEN'S ASSOCIATION to be held in Chicago, Ill., with exhibits at the International Amphitheater, and headquarters of the convention at the Palmer House. American Foundrymen's Association, 222 W. Adams St., Chicago, Ill.

MAY 7-8 — National Production meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Bond Hotel, Hartford, Conn. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

MAY 13-14 — Spring meeting of the ASSOCIATED MACHINE TOOL DEALERS OF AMERICA at the Claridge Hotel in Atlantic City, N. J. Thomas A. Fernley, Jr., executive secretary, 505 Arch St., Philadelphia, Pa.

MAY 19-23—Forty-fifth annual CREDIT CONGRESS of the National Association of Credit Men at the Royal York Hotel, Toronto, Canada. R. H. Ryan, chairman, National Committee, Pratt & Whitney Division, Niles-Bement-Pond Co., Hartford, Conn.

MAY 20-22—Annual convention of the AMERICAN GEAR MANUFACTURERS' ASSOCIATION at Grove Park Inn, Asheville, N. C. J. C. McQuiston, manager-secretary, 602 Shields Bldg., Wilkinsburg, Pa.

MAY 21-22—Forty-second annual convention of the NATIONAL METAL TRADES ASSOCIATION at the Hotel Biltmore, New York City. Harry S. Flynn, secretary, 122 S. Michigan Ave., Chicago, Ill.

JUNE 9-14 — Summer meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Greenbrier Hotel, White Sulphur Springs, W. Va. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

JUNE 17-20 — Semi-annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Hotel Pfister, Milwaukee, Wis. Clarence E. Davies, secretary, 29 W. 39th St., New York City.

JUNE 24-28 — Annual meeting of the AMERICAN SOCIETY FOR TESTING MATERIALS at Atlantic City, N. J. C. L. Warwick, secretary-treasurer, 260 S. Broad St., Philadelphia, Pa.

JUNE 25-29—PRODUCTION AND MACHINE TOOL SHOW—an independent exhibition —to be held in the Cleveland Public Auditorium, Cleveland, Ohio. Richard C. Bonner, manager, Grafton, Wis.

SEPTEMBER 3-6 — Fall meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS in Spokane, Wash. C. E. Davies, secretary, 29 W. 39th St., New York City.

SEPTEMBER 18-20 — Eighteenth annual conference of the NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION to be held at the Hotel Statler, Detroit, Mich. For further information, address National Industrial Advertisers Association, Inc., 100 E. Ohio St., Chicago, Ill.

OCTOBER 7-11—NATIONAL SAFETY CONGRESS AND EXPOSITION to be held at the Stevens Hotel, Chicago, Ill., under the auspices of the National Safety Council, 20 N. Wacker Drive, Chicago, Ill.

OCTOBER 8-12 — SOUTHERN POWER AND ENGINEERING SHOW in the Armory Auditorium, Charlotte, N. C. For further information, address Junius M. Smith, vice-president, Southern Power and Engineering Show, Inc., P. O. Box 1225, Charlotte, N. C.

OCTOBER 21-25 — NATIONAL METAL EXPOSITION, to be held at Cleveland, Ohio, under the auspices of the American Society for Metals. W. H. Eisenman, secretary, 7301 Euclid Ave., Cleveland, Ohio.

DECEMBER 2-5—Annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS in New York City. C. E. Davies, secretary, 29 W. 39th St., New York City.

DECEMBER 2-7 — Fourteenth NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING to be held at the Grand Central Palace, New York City. For further information, address International Exposition Co., Grand Central Palace, New York City.

NEW BOOKS

PROCEDURE HANDBOOK OF ARC WELDING DESIGN AND PRACTICE. 1125 pages, 5 3/4 by 8 3/4 inches; 1557 illustrations. Published by the Lincoln Electric Co., 12818 Coit Road, Cleveland, Ohio. Price, $1.50 in the United States; $2 elsewhere.

This is the sixth edition of a handbook on arc welding, encyclopedic in scope, which is written especially for the use of designers, engineers, architects, production managers, welding supervisors, and operators. It will also prove of great value to students. The previous edition has been largely rewritten and expanded to include all the new developments in arc welding, both in methods and equipment. The material presented in the new edition represents the results of the work of two hundred arc-welding application engineers who have been gathering data for the last two years from every industry.

The book is divided into eight sections, covering the following subjects: Welding Methods and Equipment; Technique of Welding; Procedures, Speeds, and Costs for Welding Mild Steel; Structure and Properties of Weld Metal; Weldability of Metals; Designing for Arc-Welded Steel Construction of Machinery; Designing for Arc-Welded Structures; and Typical Applications of Arc Welding in Manufacturing, Construction, and Maintenance.

The text and illustrations have been condensed and arranged to avoid waste space as much as possible, and the book is printed on a lighter stock, which results in a considerable reduction in size, in spite of the fact that twenty per cent more material has been included in this edition.